SEP 26 1927
Medical Lib.

Vol. XIV SEPTEMBER, 1927 No. 3

AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY

ADVISORY EDITORIAL BOARD

FRED L. ADAIR	PALMER FINDLEY	C. JEFF MILLER
CHANNING W. BARRETT	ROBERT T. FRANK	GEORGE CLARK MOSHER
C. L. BONIFIELD	GEORGE GELLHORN	HENRY P. NEWMAN
J. WESLEY BOVEE	ALBERT GOLDSPOHN	GEO. H. NOBLE
W. W. CHIPMAN	WILLIAM P. GRAVES	REUBEN PETERSON
H. S. CROSSEN	HERMAN E. HAYD	JOHN OSBORN POLAK
THOMAS CULLEN	BARTON C. HIRST	F. F. SIMPSON
ARTHUR H. CURTIS	E. J. ILL	HENRY SCHWARZ
EDWARD P. DAVIS	FLOYD E. KEENE	HOWARD C. TAYLOR
JAMES E. DAVIS	J. C. LITZENBERG	GEORGE GRAY WARD
J. B. DeLEE	F. W. LYNCH	B. P. WATSON
ROBERT L. DICKINSON	FRANKLIN H. MARTIN	J. WHITRIDGE WILLIAMS

OFFICIAL ORGAN OF
THE AMERICAN GYNECOLOGICAL SOCIETY
THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS, AND ABDOMINAL SURGEONS
NEW YORK OBSTETRICAL SOCIETY; OBSTETRICAL SOCIETY OF PHILADELPHIA; BROOKLYN GYNECOLOGICAL SOCIETY; ST. LOUIS GYNECOLOGICAL SOCIETY; NEW ORLEANS GYNECOLOGICAL AND OBSTETRICAL SOCIETY

Editor . . . . . GEORGE W. KOSMAK
Associate Editor . . HUGO EHRENFEST

Entered at the Post Office at St. Louis, Mo., as Second Class Matter.

PUBLISHED BY C. V. MOSBY COMPANY, 3523-25 PINE BLVD., ST. LOUIS, U. S. A.

Mead's Standardized Cod Liver Oil

is accepted as a criterion of excellence by physicians and by other pharmaceutical houses. *It is an established measure of quality regulated by a standard.*

A more definite description will be found on back cover and on inside back cover page.

MEAD JOHNSON AND COMPANY, Evansville, Indiana, U. S. A.
Manufacturers of Infant Diet Materials Exclusively

The Three Principal Disadvantages of Digitalis

1. Uncertainty of action
2. Premature gastric disturbance
3. Unsuitability for hypodermic injection

DIGIFOLINE, "CIBA"

OVERCOMES THEM ALL

TABLETS LIQUID AMPULES

CIBA COMPANY, Inc.

CEDAR AND WASHINGTON STREETS
NEW YORK CITY

Canada: Ciba Co. Ltd., 146 St. Peter Street, Montreal

The American Journal of Obstetrics and Gynecology

VOL. XIV ST. LOUIS, SEPTEMBER, 1927 No. 3

Original Communications

THE RESPONSIBILITY OF THE OBSTETRIC TEACHER IN RELATION TO MATERNAL MORTALITY AND MORBIDITY*

BY B. P. WATSON, M.D. (EDIN.), F.R.C.S. (EDIN.), F.A.C.S.
NEW YORK, N. Y.

(Professor of Obstetrics and Gynecology, Columbia University, Director, Sloane Hospital for Women)

IN RECENT years and especially since the termination of the World War there has been in all countries an increasing interest in and anxiety regarding maternal mortality and morbidity. All sorts of inquiries and commissions have been set up and reports published with so far, little apparent result. I say apparent result because statistics are traditionally unreliable and in the case of the maternal death rate more so than usual. When we try to compare the maternal death rate today with what it was fifty years ago we are attempting the impossible for the figures of fifty years ago, when registration was very defective in all such countries as had it, are not true figures.

For example, registration of deaths in its present form was begun in Scotland in 1855 and it is startling to find that the maternal death rate from all causes was apparently higher in the years 1915-1922 than in the years 1855-1864, whilst the death rate from puerperal sepsis was the same in the two periods. (Table I.)

It is inconceivable that the death rate from puerperal sepsis is as high today as it was in 1855. At that time the teaching of Semmelweis had not been generally accepted. White's teaching has been largely forgotten.

Epidemics of childbed fever were still frequent in hospitals and of course Listerism was not yet born. There must be a fallacy some-

*Read at a meeting of the Obstetrical Society of Philadelphia, December 2, 1926.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

TABLE I. DEATHS FROM PUERPERAL CAUSES IN SCOTLAND, 1855-1922—DECENNIAL MEANS

YEARS	TOTAL DEATHS	METRIA OR PUERPERAL FEVER	OTHER DISEASES AND ACCIDENTS OF CHILDBIRTH	TOTAL	PUERPURAL FEVER	OTHER DISEASES OF CHILDBIRTH
1855—1864	512	180	332	4.9	1.7	3.2
1865—1874	595	213	382	5.1	1.8	3.3
1875—1884	660	252	408	5.2	2.0	3.2
1885—1894	658	306	353	5.3	2.5	2.8
1895—1904	605	246	359	4.6	1.9	2.7
1905—1914	703	216	488	5.6	1.7	3.9
1915—1922	704	194	510	6.2	1.7	4.5

TABLE II. RECORDS OF DR. C. E. DOUGLAS AND HIS PREDECESSOR IN PRACTICE

DATE	NUMBER OF CASES	DEATHS FROM SEPSIS	RATE PER 1,000
1847-1864	936	16	17.0
1880-1891	550	4	7.2
1891-1923	1670	2	1.7

where and this is borne out by a most interesting communication by Dr. C. E. Douglas who has in his possession the full midwifery records of his predecessor in a mixed town and country practice in Scotland. In his case book there is a record of 936 cases attended between 1847 and 1864. (Table II.) There were twenty maternal deaths, giving a rate of 21 per thousand. In the ten years ending 1864 the general maternal death rate for the whole of Scotland, according to the Registrar's returns, was 4.9 per thousand. In 14 of the 20 who died no mention is made of any complication or operative interference at delivery, so it may be assumed that they died of sepsis—a mortality rate from sepsis of 17 per thousand. As Douglas points out, such a rate is not surprising when we realize the nature of the obstetric procedures of these times. A tedious first stage was treated by venesection in the first instance, followed by "an opiate enema"; if this did not suffice the os was dilated manually. The second stage was mainly concerned with support of the perineum, for hours if need be. Hamilton mentions having done this for twelve hours without leaving the patient—and "fine lard," to the extent of a pound for a case, was used to lubricate the passage. The third stage was a still more extraordinary performance. You felt along the cord till you could reach the center of the placenta, and if this could be done it was ready for extraction. Twisting the cord around the fingers of the right hand you pulled on it till it came away, again supporting the perineum with the left hand. If the placenta were retained for more than an hour it should be removed. If adherent, the placenta is to be grasped by the examining hand, and "pressure is now to be made upon its substance, bringing its circumference towards its center and detach-

ing leisurely and carefully all that can be separated by this manipulation. The separated mass is to be extracted by pulling with the navel string."

In the same district, Douglas himself has practiced and from 1880 to 1923 attended 2,200 midwifery cases. From 1880 to 1891, the time during which it was beginning to be realized how important antiseptic precautions were, he had 550 cases with a septic mortality of 7.2 per 1000. From 1891 to 1923 he had 1670 cases with a septic mortality of 1.7 per 1000. (Table II.) Those figures are, probably, far more reliable than those of the Registrar-General, although the numbers dealt with are small, and they go to show that there has been a very considerable reduction in the death rate from sepsis and other causes in the last seventy years.

We cannot, however, get away from our present day figures of maternal mortality and they are very much the same in all countries in which registration of deaths is on a comparable basis. I quote the Scottish figures as being more immediately familiar to me but they differ little from those of the United States and it is not my intention to draw comparisons. It may be said generally that the maternal mortality from all causes in all countries varies from 4 to 7 per thousand and that it has shown little change in the past twenty years. Dr. Janet Campbell writing of England says, "The general death rate has been reduced one-third; the infant mortality rate has been halved since the beginning of the century, yet the maternal mortality rate is little lower than it was twenty years ago." *(Maternal Mortality, Ministry of Health Publication, London, 1926.)*

While it is certain, therefore, that the maternal death rate has been reduced in the last fifty years it has not shown that rapid diminution observed in the general death rate in recent years. Is this because we have reached the irreducible minimum or are some of these deaths preventable? It is held by some, and there are certain biologic facts to support them, that the pregnant and parturient woman has "an increased susceptibility to death" (Douglas) as compared with her nulliparous sister and that the process of reproduction must in certain instances result in the death of the mother. Those of us who are engaged in hospital and consulting obstetric work realize, however, that maternal deaths, in many instances, are not the direct result of the parturient process as nature planned it but are the result of ill advised, ill timed or misdirected efforts to supplement or supplant nature's methods.

We have heard a great deal in recent years about obstetrics being a surgical specialty and that the obstetrician should be first and foremost a surgeon. That is all to the good in so far as this conception has been the big factor in improving the technic of the delivery room

but it is all to the bad if it leads the budding practitioner to think that every case must be subjected to surgical procedures. Therefore, along with this insistence on the surgical nature of obstetrics there must go a redoubled effort on the part of teachers to impress upon their students the essential normality of the vast majority of cases and the dangers of unnecessary interference.

There is a greater need today than ever there was to preach against "meddlesome midwifery" because with our increased hospital facilities, the attendance of trained nurses, and the ease with which a "set up" for the operation can be made there is a greater temptation to interfere. Do our students in their hospital training see too many instrumental deliveries in proportion to normal deliveries? Speaking from my own experience I think that they do and that they are likely to go away with a wrong impression unless the teacher is at pains to discuss fully with them the indications for every interference. They see the skilled obstetrician emerge successfully from a difficult forceps case, or version and breech delivery and do not always realize that his success is due partly to the ideal conditions under which he is working as regards "set up" and assistance, partly to his individual skill, and that if they attempted the same procedure in the home of one of their future patients they would be lacking in both. They do realize this in the case of a major surgical operation and from this point of view it must be driven into them that operative obstetrics is surgery and very often major surgery and that before they can undertake these operations they must have more training than they can possibly receive in their undergraduate course.

Such a statement at once raises the question as to how much we can teach the student before graduation and, in the absence of any future special hospital training, how much obstetric work such teaching equips him for. This question has been answered more fully in the case of medicine and surgery than it has been in obstetrics. An undergraduate course in surgery does not pretend to train the student as a surgeon. It aims at training him in diagnosis, in being able to recognize the necessity for surgical interference, and in the performance of minor surgical operations. Our aim as obstetric teachers should be the same.

How best to accomplish that aim is in some details a matter of opinion. I, personally, am convinced that a course of theoretic instruction should precede clinical study and that that instruction should be largely in the form of lectures and demonstrations, supplemented by the reading of a standard textbook. Trained as I was in the Edinburgh School where the systematic lecture constituted and still constitutes such an important part of the student's training I may be regarded as prejudiced, but experience of other methods in other schools has confirmed me in my belief that it is only by such means

that the average student can be grounded in the principles of the subject and be given that broad outlook which is essential to the clinical application of these. The lectures should reflect the individuality of the lecturer. They should deal with broad facts of anatomy and physiology and should be freely illustrated by clinical word pictures. They should be dogmatic,—the student will learn to argue about them later. They should all be given, I think, by the same man and he should be the senior member, or one of the senior members, of the department. After such a broad survey of the whole subject, and this can be easily accomplished in forty or fifty lectures, the student is in a position to benefit from his individual clinical instruction and contact with patients in a way which would be otherwise impossible.

In most medical schools the time set apart in the curriculum for clinical obstetrics is too short. An absolute essential is that the work should be concentrated and that over a certain period it should be the only activity of the student. A period of actual residence in the hospital or in a hostel in connection with it is necessary if he is to get the full benefit.

In planning the student's course of clinical instruction emphasis should be laid on diagnosis and this can be learned only in the prenatal clinic and prenatal wards. In all our teaching hospitals we now have large prenatal clinics which afford ample material for instruction. This should consist in a thorough training in clinical pelvimetry and abdominal palpation. It is most gratifying to find how quickly the student acquires proficiency in these if he is given the proper instruction and guidance at the beginning. It requires patience and time on the part of the teacher but these are amply repaid when he finds that after a short time his student can fairly accurately measure and type a pelvis, diagnose presentation and position and form an estimate of the relative size of head to pelvic brim. If we could insure that every graduate left his medical school with such a training, that he appreciated the importance of such examinations in every case and realized that a disproportion called for further examination and consultation before the onset of labor we could confidently look for a marked diminution in the maternal death rate within the next few years. It is well within our capacity to give such training and well within the capacity of the student of today to fully avail himself of it. In this one direction alone there are, therefore, great possibilities.

In the prenatal clinic also he must be taught the importance of the various complications of pregnancy especially the early and late toxemias, the anemias, the heart affections, the focal infections. He should see carried out, and should carry out himself, a full physical examination of the patients, take their blood pressures, examine their urines. When abnormalities are detected he listens to the advice given them. He follows them into the prenatal wards when their condition

calls for hospitalization. He is soon struck by the number requiring such hospital care. The late Dr. Studdiford found that over a period of seven years, 20 per cent of the patients attending the prenatal clinic at the Sloane Hospital required special advice and treatment and that 12 per cent were admitted to the prenatal wards. The student is thus impressed with the importance of prenatal care and sees the rapid improvement in the patients as the result of appropriate treatment begun early. It is brought home to him that eclampsia is a preventable disease and to have it occur in a patient for whom he is responsible is a reflection on himself.

He will not get all this from his work unless he is guided and taught. There must be an atmosphere of enthusiasm at every clinic. It is all very prosaic to us but it is all new to him. He is keen to learn, keen to recognize the various conditions he has heard and read of, and elated when he does so. To my mind there is no stronger argument for a systematic theoretic training before the beginning of clinical work than this joy of being able to recognize in the patient before him some condition about which he already knows. Knowledge so acquired is never likely to be forgotten, even when with passing years enthusiasms wane.

With such teaching and practice in the prenatal department the student is in a position to study and conduct labor. He has passed through his hands patients who have been labelled as normal and for whom a normal unaided labor is anticipated. He has given them a good prognosis. If he has not done so himself he finds from the history sheet that some one else has. When he sees these patients in the labor room he knows that, given time, the great majority will deliver themselves unaided. His part is to maintain an attitude of watchful waiting. The training he has got in abdominal palpation enables him to diagnose with certainty presentation and position without vaginal examination. He must be taught to follow the progress of the labor from the frequency and strength of the pains and the behavior of the patient during them. The descent of the head during the second stage is followed by abdominal palpation. It is impressed on him that every vaginal examination is a possible danger to the patient. He keeps careful watch on the fetal heart. He is in close touch with the patient throughout the whole duration of the labor.

His surgical training ought to have drilled him in aseptic technic. My experience is that he is often sadly deficient in this. I hope our surgical colleagues are duly grateful to us for directing and completing this part of the student's education. That technic should be as simple as efficiency will permit. In his early years of practice the young graduate will probably have to do his work under less favorable conditions than in his school hospital and he should be able to appreciate and insist on the essentials. When operative delivery is

necessary the definite indications for it ought to be explained and discussed. In undergraduate teaching such procedures as "prophylactic forceps" and routine version have no place. He must be given practice in the various obstetric manipulations and operations but the proper place for that is in the manikin room.

A not inconsiderable part of the total maternal mortality is from the antepartum hemorrhages. What should we teach our students regarding the treatment of these? The only safe teaching to my mind is to impress on them more and more the seriousness of every such case and the absolute necessity for consultation and hospital care as soon as the condition shows itself. The cases which end fatally are usually those which have been temporized with in their own homes and admitted to hospital only after repeated hemorrhages and attempts at treatment such as packing. Those which survive the immediate hemorrhage help to swell the septic death rate.

And when sepsis does supervene under those or under any other circumstances what ought we to teach them regarding it? In the first place we must try to visualize for them the actual processes going on in the body. We must picture to them a large, rather flabby, very vascular and edematous organ undergoing more or less rhythmic contractions which produce periodic changes in the state of fulness or emptiness of the large venous sinuses and lymphatic channels. As it contracts blood and lymph are being squeezed out of these channels into the general blood and lymph stream. As it relaxes material from the interior of the uterus may be sucked into them, and so, at the next contraction, be passed on to the general circulation. The inner surface is a large raw or granulating area with tags of varying size of dead and dying tissue attached to it. In these are numerous organisms of various kinds, for the most part harmless saprophytes but also pathogenic or potentially pathogenic germs. In the fight against these we picture the barrier zone of leucocytes in the layer just under the surface, and we imagine the attack of the hosts of bacteria being repelled by them. We hope that the defenders will win the day, and that, with the death of the last invader, victory will be won. We dread the giving way of this first line of defence and do everything to preserve it, and would not wilfully remove it. Its giving way is indicated to us by the prolongation of the fever, by the more rapid pulse, by the more toxic condition of our patient, by the noninvolution of the uterus. We are almost certain a breach has been made in it when a rigor occurs, and we are sure when we find the organisms in the blood. But the fight is not yet over. We now imagine the deeper parts of the uterine wall invaded but defences being rushed up—the leucocytes and tissue cells are reacting and proliferating, the serum has developed in it antibodies which, like poison gas, stupify the organisms and render them easy victims for the leucocytes or kill

them outright. Those that invade the blood stream do not long survive and recovery may take place. Or we see the attack directed along the lymph channels. The temperature is high but fairly steady, there is pain, there is tenderness above the brim of the pelvis, there is induration to be felt—a cellulitis has developed. Cellulitis means strong reaction on the part of the tissue cells, and we rejoice for the localization. But it must be watched. Resistance may still be insufficient and suppuration may occur, which must be detected early to prevent wide extension. Or again resisted in the actual tissues we imagine the organisms working their way insidiously along the venous channels, producing thrombosis as they go, and escaping from time to time in large numbers into the blood stream or carried into it on small emboli. This is the picture when, after days of high fever, our patient has recurrent rigors with hyperpyrexia and positive blood culture, a septic thrombophlebitis. Her state is now more than serious, but there is still a slender hope of recovery.

Or we see the defence fail altogether and the leucocytes and tissue cells killed off in great numbers. Minute beads of pus everywhere form in the thrombosed vessels and in the lymphatic channels, the tissue cells are felled by the toxins, they have made their utmost effort, and are incapable of more. The organisms march on, invading every part of the body through blood and lymph stream, settling down to renewed effort in those parts that please them—the serous surfaces, the lungs, the heart. The woman is doomed.

All of which leads up to an emphasis of the danger of interference with the interior of the uterus in cases of sepsis, postpartum or postabortal.

With such training as a student can the doctor live up to his ideals in practice? Let us grant at once that it is difficult for him to do so. In the first place he is handicapped in his prenatal work by the failure of his patients to consult him early in pregnancy. With the education of the public the importance of antenatal supervision is being brought home to women and in the future less and less difficulty will be experienced in this direction. The medical profession in the United States deserves great credit for the enlightening of the public in this regard. Ballantyne of Edinburgh was one of the first to impress upon us the importance of antenatal care but Scotland and England have lagged behind this country in the provisions made for carrying it out. They are now very much alive to the necessity and there will be a rapid improvement in the immediate future. The big problem there, as here, is in the rural areas.

Where hospital accommodation is obtainable it is easier for the practitioner to live up to his ideals in the conduct of labor than when he has to practice domestic obstetrics. In the latter the importunity of relatives and the saving of his own time tempt him to interfere when

his better judgment would restrain him. In the hospital his patient is watched by competent internes or nurses while he proceeds with the rest of his day's work and he is called only when necessary. Are something approaching the same conditions obtainable in domestic practice?

As you know, in Britain, a large percentage,—50 per cent or more of the women are delivered by trained midwives. The maternal mortality among the cases so cared for is certainly not higher, and in many areas is lower, than in those delivered by doctors. The drawback to the midwife is that she is not capable of giving adequate antenatal supervision. There is, therefore, a growing feeling among obstetric teachers in Britain that in large industrial areas and in rural districts there ought to be active cooperation between doctor and midwife, that while the former should be responsible for the antenatal care of the patient the latter should, in normal cases, be in attendance at the delivery, calling in the doctor only should necessity for interference arise. I know several very busy practitioners in working-class communities who have organized their obstetric work along these lines. One of them, who has the assistance of two or three trained and registered midwives, informed me recently that he had reduced the incidence of forceps delivery in his practice from 30 per cent to 3 per cent and that he now has leisure for reading and attending society meetings which he never had formerly. I mention these facts for your information and not with any idea that conditions here would necessarily permit of such an arrangement in our industrial and rural areas. There are many aspects of the midwife problem in Britain which are disturbing and call for investigation and improvement. One is that the best type of fully trained nurse does not take up this work because of the uncertain and often poor financial return and because of the poor social status she has. With such a system of cooperation with the doctor I think that a better type of woman would go in for the profession and quickly take her proper place in the community. If some such thing came about I feel certain that it would go a long way to solve the problem so far as Britain is concerned.

I do not yet know enough of conditions here to venture any opinion as to how such a system would work in the United States. The word midwife conveys a different meaning here from what it does in Britain and European countries. The "Trained Obstetric Nurse" would be a better designation. Is it possible that,—I know the subject has been discussed by many and I ask the question for my own information,—the active cooperation of the "Trained Obstetric Nurse" and the doctor may be a possible way in which to overcome the difficulty of the large domiciliary obstetric practice? Such a nurse would act the part the interne does in hospital practice. She would require to be trained in the conduct of labor as well as in obstetric nursing. Those of us who

have been accustomed to working in hospitals with such well-trained nurses know how efficient they become, how accurate their diagnosis and prognosis and how reliable they are in every way. Until sufficient hospital accommodation is provided to take care of every delivery, and it will be a long time till that comes about throughout the country, it seems to me that this method may have possibilities. It would give the busy practitioner conditions approaching those enjoyed by the hospital obstetrician and would enable him to maintain the standard of obstetrics at a higher general level than has hitherto been possible.

1125 Fifth Avenue.

(For discussion, see page 396.)

A STUDY OF AN UNDESCRIBED TYPE OF PREMATURE SEPARATION OF THE NORMALLY IMPLANTED PLACENTA

By J. Hofbauer, M.D., Baltimore, Md.

(Associate Professor of Obstetrics, Johns Hopkins University)

In the present paper, the report is given of a case of profuse concealed hemorrhage derived from a very small area of separation of the normally implanted placenta. It seems worthy of being recorded mainly because of the minute size of the area of separation, as well as because of the concomitant abnormal conditions which apparently played a part in the production of the accident, and which in turn decided the treatment employed.

The patient, an unregistered multipara aged 39 years, was seen by the Outside Service on the evening of August 5, 1926. She gave a history of having had nine spontaneous deliveries at term and two premature labors. Previous medical history was negative. Date of last menstrual period, first half of January, date of quickening, May. She stated that the pregnancy was uneventful until 2:00 P.M. today, when she noticed slight abdominal pain, which became continuous and severe six hours later. On admission to the hospital, the following data were ascertained: Patient restless, expression anxious. Visible mucous membranes pale; slight edema of the ankles; urine contains small amount of albumin; blood pressure 190/145; pulse 120 and fairly strong. Uterus was spherical in shape with fundus three fingers beneath the xiphoid process, in continuous tetanic contraction, and was extremely tender particularly in the region of the lower uterine segment. Owing to the ligneous consistency of the uterine wall, the child's position could not be determined. Fetal heart inaudible. Rectal examination showed the external os 2 cm., with cervical margins thick and unyielding.

The sudden onset of persistent abdominal pain, acute anemia, the ligneous consistency of the uterus, and the serious general condition of the patient, pointed to the presence of concealed hemorrhage. As a preliminary to blood transfusion, the patient's blood was matched. The extreme sensitiveness of the lower uterine segment, which seemed to point to an overstretching of its walls or to intramuscular hemorrhage, which would probably be associated with deficient retraction, made me fear the possibility of postpartum hemorrhage and was the decisive factor

in causing me to elect the abdominal route. Moreover, the existence of a severe toxemia, and the fact that when the uterus was exposed it was found to be studded with numerous myomatous nodules, as well as presenting the characteristic copper-like discoloration of its anterior wall, made me feel that supravaginal amputation of the unopened uterus would be the wisest course.

Upon opening the abdomen, a certain amount of blood stained fluid escaped, and upon eviscerating the uterus it was found that the veins of the left broad

Fig. 1.

ligament were intensely engorged. The unopened uterus was then removed along with the left appendages, while the right appendages were left in situ. The cervical stump was cared for in the usual manner and the bladder peritoneum sutured to the posterior surface of the cervix. The abdominal wall was closed in three layers. At the end of the operation, which lasted forty minutes, 500 c.c. of citrated blood were transfused. The patient stood the operation well and was discharged in excellent condition after 18 days, with a blood pressure 128/80 and normal kidney function.

Description of the Specimen

The uterus measures 19x15x14 cm. Its anterior surface presents a blood stained, mottled appearance, which is most marked on the left side and especially towards the margin where it extends into the broad ligament. There was almost no discoloration on the posterior wall. The entire uterus was studded with small myomata, the largest being 1.5 c.m. in diameter.

The child, 30 cm. long, was extruded spontaneously through the area of amputation when the specimen was placed in formalin. Protruding from the cut end are masses of clots, while the placenta itself is still in situ.

After hardening, the uterus was incised by a sagittal mesial section, when it was found that the placenta was adherent throughout to the posterior wall of the uterus, and that no area of separation was visible. The membranes were separated from the anterior uterine wall by an oval mass of coagulated blood and were in direct contact with the fetal surface of the placenta. In the line of section, the placenta measures 12 cm. in length and 3.5 at its point of greatest

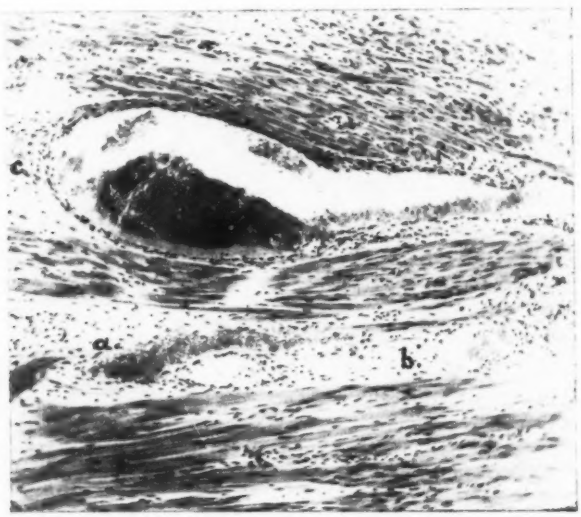

Fig. 2.—*a*, Extravasation of blood around a small vein. *b*, Edematous area. *c*, Distended vein showing formation of thrombus.

thickness. The anterior uterine wall is thicker than the posterior, measuring 3.5 and 2 cm. respectively. The finger introduced into the left half of the specimen apparently finds that the separation had occurred in the left half of the uterus.

In the search for the area of separation, a second sagittal section was made through the right half of the specimen 2.5 cm. from the midline, and the placenta was found to be in situ throughout. The remainder of the right half was then cut into six horizontal slabs and normal relations of the placenta were found in the lower five, but in the sixth or uppermost one, which includes the fundal region, it is seen that a small area of separation exists at the upper pole of the placenta. This measures 20 mm. in length and 5 mm. in height, and the blood contained in it apparently communicates with the submembranous hematoma. (See Fig. 1.) The left half of the uterus was also cut into horizontal slabs but the only area of separation discoverable was the one just described.

Microscopic examination shows a normal placenta in situ, with a normal decidua basalis presenting no signs of leucocytic reaction. In places, many fetal giant cells are present in the decidua and adjoining muscularis. The fetal surface

presents well preserved amniotic epithelium and a normal chorionic membrane. Except for small areas of typical and atypical infarct formation, the entire placenta is normal.

Sections through the single minute area of placental separation show that the decidua is disintegrated by hemorrhage with a part still attached to the maternal surface of the placenta, and the rest to the uterine wall, while between the two layers is free blood. The decidual vessels are markedly distended and in the lumina of the uterine glands is free blood. Nowhere are there any signs of inflammatory reaction.

In accord with the gross appearance, the membranes from the anterior wall can be seen in contact with the fetal surface of the placenta, and between them and the anterior wall is a mass of coagulated blood.

The muscular disassociation varies in different places. In the area in which it is most pronounced, the veins are greatly distended in such areas, and in marked contrast to those elsewhere in the uterus. The muscle fibers are spread by hemorrhage and edema, and in the latter many clasmatocytes can be made out. By consulting the microphotograph, it appears that the extravasated blood has escaped from the smaller veins and capillaries. The myomata within the uterine wall present the usual structure except for areas of partial necrosis which was visible in places, even on gross examination.

DISCUSSION

The specimen is of interest on account of the very small area of separation associated with pronounced clinical symptoms, and which, nevertheless, had led to abundant concealed hemorrhage which was sufficiently extensive to peel the membranes off from the entire uterine wall except at the placental site. The condition is very surprising, as it seems a priori improbable that a concealed hemorrhage of 600 c.c. could have originated from the minute area of separation which was detected in the fundal region. The specimen serves to provide confirmatory evidence of the statement made by Williams that hemorrhage into the depths of the decidua appears to be the immediate factor in bringing about the detachment of placental tissue, although in the present case, the process was only a localized phenomenon. The blood escaping between uterine wall and the placental margin, as it increased in amount gradually separated the membranes from the tissues to which they had been attached, and led to the formation of the submembranous hematoma. On the other hand, owing to the firm adherence of the membranes to the lower uterine segment, the hemorrhage remained concealed, and only a small amount of blood found its way into the vagina some hours preceding the onset of the serious condition. It seems reasonable to assume that the tense uterine wall led to an increase in intrauterine pressure, thus checking temporarily the bleeding and allowing coagulation to take place, and Fig. 1 shows that a certain amount of serum had been expressed from the dependent portion of the blood-clot.

Hysterectomy was adopted in this case, as the procedure best fitted to assure hemostasis, since the presence of multiple myomata and ex-

tensive hemorrhagic infiltration pointed to a seriously damaged condition of the uterine muscle with the attendant probability of serious postpartum bleeding had the uterus been retained. In addition, it served to sterilize the patient—a desideratum which was important in this instance as the patient had already given birth to twelve children, and especially since Couvelaire, Williams, Thaler and others have reported that repeated premature separation may occur in successive pregnancies. It is interesting to note that my review of the literature reveals only five references to successful results following abdominal hysterectomy without opening the uterus, for premature separation of the normally implanted placenta. (Malcolm Storer, v. Franqué, Zweifel, Thaler, Heidenhain.)

ETIOLOGY

Since the recent work on the pathology of premature separation of the normally implanted placenta, more particularly the studies of Couvelaire and Williams, had made it clear that we are dealing here with a definite clinical entity in which a serious involvement of the uterine wall constitutes the predominant feature, considerable interest has centered around the nature of this condition. The significant part in its pathology, as pointed out in my paper last year, is due to a lesion of the walls of the capillaries and small veins which allows plasma and red bood cells to leave the vessels in the affected areas, thus giving rise to marked edema and hemorrhages by which the muscle bundles are spread apart. It is the capillary toxicosis which constitutes the prominent feature of this condition and of eclampsia as well. DeLee in 1901 drew attention to the hemophilic nature of some cases of premature separation of the normally implanted placenta. The preponderance of evidence accumulated during the last few years both from clinical observation and autopsy findings points to a toxic element as the underlying factor in the production of premature separation of the placenta, in at least the majority of the severe cases. Williams, in his recent papers, discusses fully the pros and cons of such a reasoning, and compares the conditions with those following the action of the venom of certain snakes. The experimental work of Flexner and Noguchi shows that such poisons contain protein toxins which produce hemorrhage in various organs, chiefly as the result of endothelial injury and thrombosis; hence the term "hemorrhagin" has been used to designate their essential properties. We should remember in this connection that it is the presence of platelet thrombi and endothelial injury in the uterine wall and in the adjacent tissues which stamps the peculiar pathology of premature separation.

In the hope of learning something concerning the nature of the toxic processes obtaining in this condition, Dr. Geiling and I performed a series of experiments last year, in which the mechanism

operative in the production of premature separation of the normally implanted placenta could be simulated in pregnant animals by the intravenous administration of histamin. It is this substance, as well as a number of allied members of the "histamin group," whose effect, according to the studies of Hanzlik and coworkers, is primarily characterized by endothelial injury, which renders the capillaries more pervious to the escape of fluid and corpuscles, hemagglutination—in this way promoting the occurrence of thrombi, and at times hemolysis.

The reactions which supervene in the liver and kidneys of carnivora following the intravenous injection of histamin are described in some detail in my paper, and the striking similarity between the histologic changes obtained in these organs in acute histamin intoxication and those in eclampsia is mentioned. These observations, coupled with the most remarkable similarity in the blood chemistry in acute histamin intoxication and eclampsia, were interpreted as further evidence of the close resemblance between the two conditions, particularly, as of late a number of autopsies upon women dying after premature separation have been reported, in which the lesions in both liver and kidneys simulated those observed in eclamptic patients.

Investigation into the problem of acute histamin intoxication has of late been promoted by several workers. A. Hiller, J. La Barre and Zuntz showed that in dogs, following the intravenous administration of this drug, there occurred a definite fall in the plasma CO_2 and in the plasma hydrogen-ion concentration, a lowering of surface tension, hyperglycemia and an increase in lactic acid. Louros succeeded in producing peripheral necrosis in the liver by intravenous injections of histamin,—quite in harmony with the findings recorded in our series of experiments. In addition, the author claims to have isolated a comparatively considerable amount of histamin from fresh placentae obtained from eclamptic patients.

A recent observation made in our service may be quoted here. While operating upon a similar case as described above, I scooped out the abundant free fluid found in the abdominal cavity and tested it on a strip of virgin guinea-pig's uterus, and also on a strip of intestinal muscle. Evidence was obtained of the presence in the peritoneal exudate of a potent smooth-muscle stimulant. Although such response has recently come to be considered rather conclusive proof of the presence of histamin (see article by Forst and Weese), I am for the time being inclined to a more guarded interpretation.

Before leaving this subject, I wish to refer to a number of established principles which may throw some light on the subject of the relationship of both acute and prolonged histamin intoxication to certain ductless glands. It should be remembered in this connection

that last year Dr. Geiling and I succeeded in accurately reproducing the characteristic hepatic and renal lesions as encountered in cases of pernicious vomiting by the administration of histamin to carnivora over a prolonged period; and as a most interesting point in our observations, the production of such changes could be prevented by the simultaneous administration of insulin. Evidence pointing to an acceleration of both secretion and output of adrenalin after the introduction into the blood stream of histamin and other protein-split-products has been advanced by Abderhalden, Dale, Steppuhn, Storm van Leeuwen and others. Moreover, these investigators have also found the arterioles to be in a state of higher tonicity and increased susceptibility to adrenalin under these circumstances. The bearing of such findings on the occurrence of elevation of blood pressure in toxemias is obvious.

The clinical application of the results of our experimental studies with regard to anesthesia and blood transfusion as integral parts in the treatment of severe cases of premature separation of the normally implanted placenta has been fully discussed last year in the paper referred to above.

REFERENCES

Dale, H. H.: Jour. of Physiol., lxi., No. 2. *Flexner and Noguchi:* Univ. Penn. Med. Bull., 1904, xvi. *Forst u. Weese:* Arch. f. Exper. Path. u. Pharmacol., 1926, cxvii, 232. *Franqué:* Deutsch. med. Wchschr., 1915, p. 902. *Hanzlik, P. J.:* Jour. of Pharmacol. and Exp. Therap., xxxiii; Jour. Am. Med. Assn., 1924, lxxxii, 2001; Arch. Inter. Med., 1925, p. 36. *Heidenhain:* Centralbl. f. Gynäk., 1921, No. 25. *Hofbauer:* Am. Jour. of Obst. and Gynec., 1926, xii, No. 2. *Hofbauer and Geiling:* Bull. of Johns Hopkins Hosp., Feb., 1926. *Storm van Leeuwen:* Arch. f. Exp. Pathol. u. Pharmacol., 1920, lxxxviii. *Steppuhn:* ibidem, 1926, cxii. *Storer, Malcolm:* Boston Med. and Surg. Jour., cxxvii, 377. *Thaler:* Centralbl. f. Gynäk., 1921, p. 578. *Williams, J. W.:* Surg. Gynec. and Obst., 1915, p. 541; Jour. Obst. and Gynec. Brit. Emp., 1925, xxxii. *Zweifel:* Monatschr. f. Geburtsh. u. Gynäk., xxxvi. *Abderhalden:* Pflüger Archiv, cev; ceiii. *Louros:* Arch. f. Gynaecol., cxxix, No. 2. *Hiller, A.:* Jour. of Biological Chem., lxiii. *LaBarre, J.:* Compt. rend. de la Soc. de Biol., xev.

AMNIOTIC FLUID AS A POSSIBLE FACTOR IN THE ETIOLOGY OF ECLAMPSIA

By M. R. Warden, M.D., Warm Springs, Mont.

THE study of amniotic fluid as related to eclampsia appears to have been neglected in the study of the etiology of this disorder. No reference suggesting a causal relationship between the two has thus far been found in the literature available. Williams and Bargen,[22] however, who have studied the chemistry of amniotic fluid, state that the greater concentration of uric acid in amniotic fluid over that in the blood suggests that in the toxemias of pregnancy, the increased uric acid of the blood may arise in part from a more highly saturated amniotic

fluid. No other reference which has associated amniotic fluid in any way with eclampsia has thus far been found.

The experimental work which forms the basis for this report was begun with the hope of determining what part amniotic fluid might be capable of playing in the production of eclampsia. Experiments were planned with the belief that the disease might be due to the sudden accidental injection of a considerable amount of amniotic fluid into the maternal blood stream. How such an accidental injection could take place can only be conjectured. It was felt, however, that a slight separation of the placental margin associated with a rent in the amniotic sac near the placental site, might open a channel of communication between the amniotic cavity and the uterine veins (such as is known to occur in certain types of "blood moles") and that uterine tonicity or contraction might then force amniotic fluid into the maternal circulation. The explanation of postpartum eclampsia on this basis might offer more difficulty. The assumption might be made, however, that amniotic fluid is retained in the uterine cavity, and that it finds entrance into the uterine veins at the placental site.

Such a theory of eclampsia could account for the suddenness of onset in women who have previously been apparently quite healthy. It might account for the benefit sometimes obtained for the eclamptic patient by an early emptying of the uterus. It might also explain why in other cases this procedure is ineffective, since the methods adopted to empty the uterus often block the cervical outlet and hold the amniotic fluid in the uterine cavity under pressure. It might explain the greater incidence of eclampsia among primigravidae, since lightening, by blocking the cervical canal early, may favor the chances for the introduction of amniotic fluid into the maternal blood stream. It might throw light on the clinical observations of Stevens[23] and of DeLee,[1] who state that in their experience rupturing the membranes alone is a most valuable procedure, and is often followed by the cessation of convulsions. Indeed, if this theory is correct, the procedure which Stevens advises—that of rupturing the membranes and draining off as much amniotic fluid as possible—would appear to be one of the first indications in the treatment of the disease. Entrance of additional amniotic fluid into the blood stream might thus be prevented. The exceedingly low mortality reported by Stroganoff[24] might be explained on this basis as due in part to his practice of rupturing the membranes.

The original belief with which the experiments were begun was that amniotic fluid might be found to be toxic, and that toxicity might be due to accumulation within the amniotic sac of products of fetal metabolism. That such an accumulation could take place would seem to be indicated by the work of Williams and Bargen.[22] As a prelim-

TABLE I. THE EFFECT UPON THE FEMALE RABBIT OF

DATE OF INJECTION	RABBIT INJECTED			AMMIOTIC FLUID USED		
	NO.	WT. IN KG.	CONDITION	SOURCE	PREPARATION	MICROSCOPIC EXAMINATION OF THE FLUID INJECTED
Aug. 5	1	1.2	Not pregnant.	Rabbit A. Estimated full term, Aug. 8.	Fluid centrifuged. Supernatant fluid injected.	Not made.
Aug. 19	2	1.1	Not pregnant.	9B Estimated full term, Aug. 23.	Centrifuged. Clear supernatant fluid used.	Not made.
Aug. 23	3	1.1	Not pregnant.	C. Estimated full term, Aug. 25.	Gross particles removed by sedimentation.	Solitary red cells fairly numerous. An occasional squamous epithelial cell seen. Fluid isotonic for red cells.
Aug. 23	4	1.1	Not pregnant.	C.	Sediment from fluid given No. 3 suspended in 6 c.c. of salt sol. Grosser particles removed by sedimentation.	Many solitary squamous epithelial cells and many solitary red cells present.
Sept. 4	5	1.1	Not pregnant.	D. Primipara. Due Sept. 5.	Gross particles removed by sedimentation.	Many large solitary epithelial cells and many solitary red cells present.
Sept. 23	6E	3.0	A few hours after delivery by cesarean section.	6 E 1. Due Sept. 26 Pooled fluid of normal young	Gross particles removed by sedimentation.	Solitary red cells and a fairly large number of squamous epithelial cells, mostly solitary, but some in small clumps.
Sept. 23	7	1.2	Not pregnant. (first injection)	6 E 1.	Centrifuged. Clear supernatant fluid used.	No cells or other formed elements found.

INTRAVENOUS INJECTION OF AMNIOTIC FLUID OF THE RABBIT

HEMAGGLUTININS		DOSAGE AND METHOD OF INJECTION	EFFECT	POSTMORTEM FINDINGS
AMNIOTIC FLUID PLUS RED CELLS OF ANIMAL INJECTED	SERUM OF ANIMAL INJECTED PLUS RED CELLS MIXED WITH AMNIOTIC FLUID			
Not tested.	Not tested.	8 c.c. in a vein of the ear.	Convulsions within 5 min. and death within 10 min. after injection.	Rabbit 1. Small hemorrhages in the thymus, the lung margins, and in the right kidney.
Not tested.	Not tested.	2 c.c. in vein of ear. Repeated after 22 min. with 4 c.c. into heart, and after another 40 min. with 8 c.c. into the heart.	No appreciable effect.	
Not tested.	Not tested.	7 c.c. in vein of ear.	No appreciable effect.	
Not tested.	Not tested.	6 c.c. in vein of ear.	No appreciable effect.	
Not tested.	Not tested.	1 c.c. (total yield of D) in vein of ear.	No appreciable effect.	
Negative.	Not tested.	10 c.c. in vein of ear.	Convulsive seizure within 3 min., lasting 1 min. Death, after gasping respiration, within 5 min.	Rabbit 6 E. Multiple small hemorrhages in the lungs, and a few small hemorrhages in the atrophic thymus. Moderate active hyperemia of the leptomeninges of the brain Marked active hyperemia of both kidneys. Chronic nephritis (pitting of kidney surfaces with scarring of many glomeruli and with small retention cysts in the cortex).
Negative.	Not tested.	9 c.c. in vein of ear.	No appreciable effect.	

TABLE I

DATE OF INJECTION	RABBIT INJECTED			AMNIOTIC FLUID USED		
	NO.	WT. IN KG.	CONDITION	SOURCE	PREPARATION	MICROSCOPIC EXAMINATION OF THE FLUID INJECTED
			Second injection, 2½ hr. after the first.	6 E 1.	Sediment from fluid of first injection suspended in salt solution. Grosser particles removed by sedimentation.	Many solitary red cells, and many squamous epithelial cells of which some were solitary and some in small clumps.
Sept. 23	3	1.6	Not pregnant. Previous injection Aug. 23.	6 E 1.	Centrifuged. Clear supernatant fluid used.	Negative.
Sept. 23	8	1.0	Not pregnant.	6 E 1.	Grosser particles removed by sedimentation.	Many solitary red cells. A few epithelial cells, some in clumps.
Sept. 24	2	1.5	Not pregnant. Previous injection, Aug. 19.	6 E 2. Pooled fluid of two fetuses dead for some time in utero.	Grosser particles removed by sedimentation. (Specimen free from accidental admixture of blood.)	Degenerated epithelial cells. A few crystals and much fine amorphous débris. (Grossly the fluid had a chocolate color due to old blood.)
Sept. 27	9B	2.9	Pregnant. Due to deliver Oct. 4.	F. Due Sept. 27.	Centrifuged. Clear supernatant fluid used.	An occasional solitary red cell.
Sept. 27	5	1.6	Not pregnant. Previous injection Sept. 4.	F.	Centrifuged. Clear supernatant fluid used.	An occasional solitary red cell.
Oct. 2	10	3.4	Pregnant. Due to deliver Oct. 22.	9 B Due Oct. 4. (Second cesarean)	Diluted with salt solution and centrifuged until clear. (Specimen was entirely free from blood.)	Negative.

inary experiment to test this theory, amniotic fluid was collected from a pregnant rabbit near term, by means of a cesarean section. Since the fluid thus collected contained a small admixture of blood, it was centrifuged. A dose of 8 c.c. of the supernatant fluid was then injected into the marginal vein of the ear of a young female rabbit. Within five minutes following the injection, the rabbit had a violent convulsive seizure, and within ten minutes it had expired.

With this encouragement, the investigation was continued. Amniotic fluid was obtained in a similar manner from a gravid guinea pig, and as it also contained a slight admixture of blood, it was centrifuged. Two other guinea pigs were anesthetized, and just preceding their awakening, the fluid was injected directly into their hearts. One received a dose of 2.5 c.c. and the other 6 c.c. Neither showed any ill effects other than a short period of shivering. The fluid from another

—CONT'D.

HEMAGGLUTININS		DOSAGE AND METHOD OF INJECTION	EFFECT	POSTMORTEM FINDINGS
AMNIOTIC FLUID PLUS RED CELLS OF ANIMAL INJECTED	SERUM OF ANIMAL INJECTED PLUS RED CELLS MIXED WITH AMNIOTIC FLUID			
	Not tested.	8 c.c. in vein of ear.	No appreciable effect.	
Negative.	Not tested.	5 c.c. in vein of ear.	No appreciable effect.	
Negative.	Not tested.	5 c.c. in vein of ear.	No appreciable effect.	
Negative.,	No blood cells present.	2.5 c.c. in vein of ear.	Death within a few minutes, after short convulsive seizure and gasping respiration.	Rabbit 2. Multiple small hemorrhages in the lungs and in the thymus. Multiple parasitic cysts in the liver.
Negative.	Negative	5 c.c. in vein of ear.	No appreciable effect.	
Negative.	Negative.	3 c.c. in vein of ear.	No appreciable effect.	
Not tested.	No blood cells present.	1 c.c. in salt sol. in vein of ear. (Total yield of Rabbit 9 B.)	No appreciable effect.	

rabbit, prepared like the first, was then injected into the blood stream of a second rabbit. The result of this injection was entirely negative.

The scope of the experiments was then broadened to include a study of the solid elements in amniotic fluid; and as the investigation proceeded, a consideration of its antibody content was also undertaken.

The results obtained in this series of experiments are summarized in Table I. Specimens of amniotic fluid were obtained at seven cesarean sections upon pregnant rabbits each near full term. Ether anesthesia was used. The fluid of all normal young delivered at any cesarean was pooled. In one instance a second specimen was prepared by mixing the fluids of two fetuses which had apparently been dead for some time in utero. One abnormal and seven normal fluids, therefore, were examined. (In only two instances were fluids obtained entirely free from any admixture of blood, the amount, however, usually being small.) Injections were made into the marginal veins of the ears of ten female rabbits. One rabbit received also two injections directly into the heart. A few of the rabbits received a second intravenous injection. The effects of fourteen preparations were thus tested. Seven

animals received amniotic fluid centrifuged until clear. One of the seven died as a result of the injection. Seven received preparations which had not been centrifuged. Some of these preparations were specimens of amniotic fluid from which any blood clots present had been removed by sedimentation. Others were suspensions in salt solution of the sediment from amniotic fluid from which blood clots had been removed. By microscopic examination these preparations were seen to contain, in addition to solitary red cells, a varying number of large epithelial cells, of which some were solitary and some in small clumps. Two of the seven animals receiving these preparations died. Seven of the ten rabbits were presumably not pregnant at the time of injection, and all of the seven were young animals that probably never had been pregnant. Two of those that died were from this group of seven, and at autopsy upon the two, no evidence of pregnancy was found in either. Two animals were pregnant at the time of injection, but in neither were ill effects observed. One was injected a few hours after it had been delivered by cesarean section. It was one of the group that died as a result of injection. Its death, however, was probably due to pulmonary embolism. There does not appear to be any special factor in pregnancy, therefore, which sensitizes the rabbit toward amniotic fluid. Three animals received a second injection a few weeks after having had the opportunity to become sensitized by the first. One of these was included among those that died. Its death, however, appeared to be due not to anaphylaxis, but to embolism; and since the other two showed no ill effects, anaphylaxis probably played no part in the production of symptoms in any. Agglutination of red cells likewise probably played no part in the production of symptoms, since hemagglutinins were not found in any fluid tested.

In only three of the ten animals were any symptoms noted. (No study was made, however, of the effects of the injections upon the blood pressure or upon the urine.) The three showing ill effects all died. The symptoms in all were similar. Each had a short convulsive seizure, occurring soon after injection, followed by death. In Rabbit 1, however, the convulsion was a little later in appearing than in the other two. Its convulsion also was more violent, and was followed apparently by a short period of coma. The convulsive seizures in the other two were followed by gasping respiration, and suggested the struggle of asphyxia.

The pathologic findings in the three that died were quite similar. All had multiple small hemorrhages in the lungs and in various other organs. The brain in each was free from hemorrhage. Hemorrhages in two were especially numerous in the thymus. One had hemorrhages in one kidney. Both kidneys of another were markedly hyperemic, but appeared to be free from hemorrhage. In the kidneys of the third, no abnormality was noted. Hemorrhages in the liver were not identified in any, but by reason of the vascular nature of this organ, might easily have been overlooked. Serial sections were not made.

As to the cause of death—Rabbit 1 received the supernatant fluid of a centrifuged specimen, presumably free from emboli. It was not pregnant, and had had no previous injection to sensitize it; hence anaphylaxis seems improbable. For reasons previously mentioned, hemagglutinins probably played no part in its death. Presumably, therefore, death may have been due to some highly toxic substance in the fluid injected. By reason of insufficient amount of the specimen, adequate controls could not be made. The second animal (Rabbit 6E) received amniotic fluid which contained many large epithelial cells. Its death was apparently due to embolism resulting from these cells. That death was not due to any toxicity of the fluid injected is shown by the fact that three other rabbits (Nos. 7, 3 and 8) received injections of the same fluid with no ill effect. The third animal (Rabbit 2) had had a previous injection; the fluid injected was not a normal fluid; and it contained clumps of epithelial cells which could act as emboli. Several factors, therefore, might have played a part in producing death. The symptoms and the postmortem findings, however, would seem to indicate that death was due to pul-

monary embolism. Since the symptoms and the pathology in the three fatal cases were so similar, and since no fluid where adequate controls were possible was found to be toxic, the question arises as to whether the first death may not also have been due to embolism—resulting perhaps from a few epithelial cells which may have remained in suspension. Unfortunately, no microscopic examination of the fluid injected into this animal was made.

For the study of human amniotic fluid only one suitable specimen has thus far been available. This was obtained by rupturing the membranes at the vulva. A considerable amount was thus collected, but through a mishap later, all but about one c.c. was lost. This fluid was entirely free from blood. Suspended in it were many white particles resembling curds of cottage cheese. These by microscopic examination were seen to be composed largely of clumps of epithelial cells. A dilution in salt solution to a volume of about 5 c.c. was made with the fluid saved, and the coarse particles were removed by sedimentation. The supernatant fluid then separated was seen when examined microscopically to contain many epithelial cells, some singly and some in small clumps. It contained also much unidentified debris, and many oil globules. The latter varied in size up to about twice the diameter of a human leucocyte, and came presumably from the vernix caseosa. A dose of 4.5 c.c. of this fluid was injected into the marginal vein of the ear of a young male rabbit. The injection had no ill effect. Had the original fluid without sedimentation been injected, however, death from pulmonary embolism would almost surely have occurred. That death did not result was evidently due to a fortunate localization of the emboli known to have been present.

By reason of lack of human amniotic fluid for further study, this paper is presented, incomplete as it is, with the hope that further investigation will be stimulated where the necessary clinical material is available. It is evident that the investigation should include a study not only of the substances dissolved in amniotic fluid, and its antibody content but also of the solids in suspension. Furthermore, animals of larger size than rabbits probably should be used, since emboli of a size such that they might block the pulmonary vessels of the rabbit, might possibly pass through the lungs of the adult human being and lodge in other organs.

It is interesting in this connection to note that DeLee, in describing the pathology of eclampsia,[1] remarks that thrombi and emboli are very common in the lungs, liver, kidneys, brain, and skin, and that they consist of liver-cells, endothelium, and syncytium—the last mentioned having no significance, as it may be found in normal puerperae. He states furthermore that in the small thromboses and emboli which are constant findings in the lungs, decidual cells and fat may be found, as well as cells of the type above mentioned. Is it possible that the "liver-cells and endothelium" may be in reality cells from the skin of the fetus and from the lining of the amniotic sac, and that the emboli of fat in the lungs may come from the vernix caseosa?

SUMMARY

1. In a series of ten female rabbits given intravenous injections of preparations of amniotic fluid of the rabbit, three had convulsive seizures and died. The others developed no symptoms recognizable by

observation. The death of two of the animals appeared to be due to pulmonary embolism resulting from epithelial cells contained in the fluid injected. The other animal received fluid presumably free from emboli. The cause of its death remains undetermined.

2. Human amniotic fluid may contain abundance of material which, if injected into the blood stream, could produce embolism.

3. The theory is suggested that eclampsia may be due to the sudden accidental injection of a considerable amount of amniotic fluid into the maternal blood stream.

REFERENCES

(1) *DeLee, Joseph B.:* The Principles and Practice of Obstetrics, ed. 4, Philadelphia, W. B. Saunders Company, 1925, pp. 376-395. (2) *Williams, J. Whitridge:* Obstetrics, ed. 4, New York, D. Appleton and Co., 1921, pp. 579-598. (3) *Elwyn, H.:* AM. JOUR. OBST. AND GYNEC., Nov., 1925, x, 698. (4) *Kane, H. F.:* Surg. Gynec. and Obst., April, 1926, xlii, 569. (5) *Fitz Gibbon, G.:* Jour. Obst. and Gynec. Brit. Emp., 1922, xxix, 402. (6) *Solomons, B.:* Jour. Obst. and Gynec. Brit. Emp., 1922, xxix, 416. (7) *Carey, E.:* Surg., Gynec. and Obst., Aug., 1925, xli, 194. (8) *Eden, T. W.:* Jour. Obst. and Gynec. Brit. Emp., 1922, xxix, 386. (9) *Dienst, A:* Monatschr. f. Geburtsh., u. Gynäk., July, 1926, lxxiv, 1. Abstract, Jour. Am. Med. Assn., Oct. 9, 1926, lxxxvii, 1250. (10) *Louros, N.:* Zentralbl. f. Gynäk., May 29, 1926, 1, 1425-1488. Abstract, Jour. Am. Med. Assn., Aug. 7, 1926, lxxxvii, 453. (11) *Lawrance, J. S.:* AM. JOUR. OBST. AND GYNEC., Mar., 1925, ix, 351. (12) *Hofbauer, J.:* AM. JOUR. OBST. AND GYNEC., Aug., 1926, xii, 159. (13) *Miller, J. C.:* AM. JOUR. OBST. AND GYNEC., June, 1926, xi, 763. (14) *Polak, J. O.:* Jour. Am. Med. Assn., July 24, 1926, lxxxvii, 227. (15) *Hynd, A.:* Lancet, Oct. 31, 1925, ccix, 910. (16) Med. Sc., Sept., 1921, iv, 537-546. (17) *Stander, H. J., and Radelet, A. H.:* Bull. Johns Hopkins Hosp., June, 1926, xxxviii, 423. (18) Jour. Am. Med. Assn., Aug. 28, 1926, lxxxvii, pp. 715, 1081. (19) *Ottenberg, R.:* Jour. Am. Med. Assn., July 28, 1923, lxxxi, 295. (20) *Gruhzit, O. M.:* AM. JOUR. OBST. AND GYNEC., May, 1924, vii, 588. (21) *Oden, C. L. A.:* Jour. Mich. Med. Soc., Feb., 1925, xxiv, 110. (22) *Williams, J. L., and Bargen, J. A.:* AM. JOUR. OBST. AND GYNEC., April, 1924, vii, 406. (23) *Stevens, T. G.:* Jour. Obst. and Gynec. Brit. Emp., 1922, xxix, 426. (24) *Stroganoff, B.:* AM. JOUR. OBST. AND GYNEC., June, 1926, xi, 756.

LIVER FUNCTION IN PREGNANCY

BY ISADORE A. SIEGEL, A.B., M.D., BALTIMORE, MARYLAND

(From the Obstetrical Department, University of Maryland Medical School)

PHENOLTETRACHLORPHTHALEIN was shown to be nontoxic and almost entirely excreted by the liver by the studies of Abel and Rowntree. This led Rowntree,[1] Hurwitz and Bloomfield; and Whipple, Mason and Peightal to determine liver function by calculating the amount of the dye found in the twenty-four-hour stool collection. McNeil introduced the method of determining the appearance time of the dye by bile drainage. Finally Rosenthal popularized the use of phenoltetrachlorphthalein as a liver function test by the blood serum method.

Rosenthal[2] showed experimentally that when the liver is damaged or when 10 per cent or more of the liver is removed,[3] the dye is recovered in the serum at the end of certain intervals and in proportion

to the damage of the liver. He found clinically[4] that in a number of diseases in which the liver is damaged there is retention of the dye in the blood serum beyond the normal limits. These same findings were confirmed by Ottenberg, Rosenfeld and Goldsmith[5]; Levin-Ryney D'Amory[6]; Boardman and Schoonmaker[7]; Bull and Bauman[8]; Wm. J. Mayo[9]; Rowntree[10]; Shattuck[11]; and a host of other workers.

Considerable objection has been raised to the use of phenoltetrachlorphthalein because of its dangers. Maurer and Gatewood[12] pointed out that the dye was toxic. Rosenau[13] reviewed the literature and reported the dangers of the halogenated phthaleins as a function test to be thrombosis, frequent, local reactions at sight of injection, chills, or death.

Other symptoms were dryness, pain over liver region, purgation, possible strain on damaged liver as shown by increased hyperbilirubinemia.

To overcome these objections Rosenthal and White[14] introduced bromsulphalein (phenoltetrabromphthalein sodium sulphonate). Rosenthal experimentally[15] and clinically[10, 11] proved that bromsulphalein eliminated the dangers of phenoltetrachlorphthalein and claims that it is excreted in the bile of rabbits (85 per cent) in one hour, is rapidly removed by the liver, remains in blood stream *in toto* with extirpation of the liver, only appears in traces or not at all in urine of normal animals, greater concentration and thus smaller dose necessary (dose 2 mg. per kg. of body weight), nonirritating to vein walls in small doses and given in concentrated form, more sensitive to liver injury, and technic simpler.

My interest in bromsulphalein has been to determine its value in the testing of liver function in pregnancy and its toxemias. Already a number of investigators have used phenoltetrachlorphthalein or bromsulphalein in liver function of pregnancy. Levin-Ryney D'Amory[6] reports marked retention for over three hours of phenoltetrachlorphthalein in a case of hyperemesis gravidarum. Trainor[17] using the same drug records two cases of postpartum eclampsia with retention. Rosenfeld and Schneiders found normal elimination of the same dye in six normal cases; they believe it to be of value in differentiating neurotic from toxic vomiting of pregnancy; and they found liver function impairment in nine cases of preeclamptic toxemia. Krebs and Dieckman[20] employing the same dye add that they believe it is a good aid in differentiating renal from hepatic toxemia. Smith[21] also using phenoltetrachlorphthalein in 44 cases of toxemia, concludes that retention means preeclamptic toxemia, whereas a normal test may indicate chronic nephritis. King[22] employing bromsulphalein, agrees with the findings of the other authors.

The technic I employed was that of Rosenthal,[14] using bromsulphalein. For each 55 pounds of body weight 1 c.c. of a 5 per cent

TABLE I. HYPERTENSION WITH RETENTION OF BROMSULPHALEIN

NO.	DATE	B. P.	URINE	SYMPTOMS	TEST	COMMENT
5	4/ 9/26	108/68	No specimen	Frontal headaches and edema of feet and ankles	0	Protein free diet, etc.
	5/14/26	138/90	Negative		2·3%	
10	4/13/26	138/80	No specimen	Nausea	Very faint trace	Protein free diet, etc.
	7/ 6/26	130/80	Negative			
	8/ 3/26	120/60	Negative			
12	4/15/26	150/80	No specimen	Frontal headaches and edema of feet and ankles	Faint trace	Protein free diet, etc.
	7/22/26	120/70	Negative			
14	4/15/26	140/75	No specimen	Edema of legs and constipation.	Faint trace	
	5/20/26	150/90	Negative		5%	
	7/ 8/26	122/70	Negative	Pain in abdomen	4%	
32	4/29/26	140/85	No specimen	None	5%	
	5/27/26	140/100	Negative		5%	Protein free diet, etc.
36	4/29/26	132/75	No specimen	Nausea, headaches and nosebleed	5%	Protein free diet, etc.
	7/29/26	120/72	Negative	None	Faint trace	
37	4/30/26	148/96	No specimen	Frontal headaches, edema of feet and ankles	Trace	Protein free diet, etc. Test repeated twice again but patient left clinic before end of half hour.
	6/14/26	140/80	Negative	Headaches and vertigo.		
	7/ 9/26	140/72	Negative			
45	5/ 3/26	150/90	No specimen	Slight headaches	3 to 4% (52 min.)	Protein free diet, etc.
	6/ 1/26	140/90	Albumin—faint trace		3%	
	6/ 8/26	140/85				
46	5/ 3/26	140/80	No specimen	Edema of feet and ankles	3·4%	
	6/ 1/26	115/70	Negative		3%	

All cases delivered normally unless otherwise noted.

All cases delivered normally unless otherwise noted.

TABLE I—CONT'D

NO.	DATE	B. P.	URINE	SYMPTOMS	TEST	COMMENT
52	5/ 6/26	145/90	No specimen	Constipation	Trace	Protein free diet, etc.
	6/17/26	135/85	Negative	None		
	7/ 1/26	130/90	Negative	None		
53	5/ 6/26	140/85	No specimen	None	0	Protein free diet, etc.
	5/20/26	150/90	Negative		Trace	Broke diet
	6/24/26	155/80	Negative		1%	Broke diet
	7/29/26	150/82	Negative		1·2%	Broke diet
56	5/ 7/26	150/100	No specimen	Slight edema	Trace	Protein free diet, etc.
	5/14/26	156/92	Albumin +			
61	5/11/26	150/76	No specimen	Nausea, slight edema and frontal headache	Very faint trace	Protein free diet, etc.
	6/15/26	144/85	Negative			
62	5/11/26	140/70	No specimen	Nose bleed and edema of feet	Very faint trace	
	5/26/26	125/75	Negative			
63	5/11/26	190/120	No specimen	Nausea, slight headache	Very faint trace	Protein free diet, etc.
	7/20/26	170/120	Negative	None	Faint trace	
	8/ 3/26	194/130	Albumin +	Edema	4%	
70	5/11/26	134/68	No specimen	None	0	
	6/ 8/26	160/90	Negative	None	0	
	8/10/26	160/90	Albumin +		Very faint trace	
	8/17/26	150/95	Albumin +	Edema	2%	
72	5/14/26	140/84	No specimen	Nausea, headache, edema of feet and ankles and nose bleed		Left clinic
74	5/18/26	134/70	No specimen	Nausea, headache and edema	Trace	
	7/20/26	104/66	No specimen		Trace	
84	5/20/26	140/100	No specimen	Frontal headache, constipation and slight edema	0	Protein free diet, etc.
	6/17/26	160/105	Negative		1·2%	6/29/26—33 wk. spontaneous delivery

TABLE I—CONT'D

NO.	DATE	B. P.	URINE	SYMPTOMS	TEST	COMMENT
85	5/25/26	145/80	No specimen	Nausea, constipation and edema	3%	Protein free diet, etc.
86	5/25/26	162/90	No specimen	Nausea and edema of feet	Very faint trace	Protein free diet, etc.
	6/ 8/26	160/100			1-2%	Eight weeks postpartum.
	8/19/26	134/78	Negative		0	
90	5/28/26	130/75	No specimen	Nausea and headache	Trace	Protein free diet, etc.
	6/25/26	152/80	Negative	Frontal headache	Very faint trace	
91	5/28/26	135/80	No specimen	Slight edema	Trace	
	6/11/26	138/90	Negative			
92	5/28/26	135/85	No specimen	Nausea, headaches and slight edema	Trace	
	6/11/26	140/90	Albumin—trace		Very faint trace	
	7/22/26	135/90			Trace	7/20/26 patient admitted to hospital with B. P. 190/130 at 7 P.M. at 8 P.M. delivered of twins. B. P. dropped to 155/130. Two hours later P. P. hemorrhage, 500 c.c.
98	6/ 1/26	130/80	No specimen	Headache and edema of feet and ankles	4+%	Protein free diet, etc.
	6/29/26	140/85	Negative		2-3%	Left clinic
110	6/10/26	130/80	No specimen	Headache and constipation	3%	
	7/20/26	118/80	Negative	None	1-2%	Left clinic
111	6/10/26	160/100	No specimen	None	Very faint trace	Protein free diet, etc.
	8/ 5/26	160/90	Negative		0	Previous pregnancy in 1922. B. P. systolic 150-134-162
118	6/15/26	130/70	No specimen	Headache and slight edema	3%	Protein free diet, etc.
	7/13/26	140/90	Negative		1-2%	Three weeks postpartum.
	9/ 2/26				0	

TABLE I—CONT'D

NO.	DATE	B. P.	URINE	SYMPTOMS	TEST	COMMENT
119	6/15/26	136/70	No specimen	Headache and slight edema	1-2%	
	8/17/26	130/70	Negative	None	1%	
	8/31/26	120/70	Negative			9/17/26 low forceps
121	6/17/26	145/85	No specimen	Headache and slight edema	1%	Protein free diet, etc.
	7/ 1/26	120/82				
124	6/18/26	160/105	No specimen	Nose bleed and headaches	Faint trace	Protein free diet, etc.
	7/ 2/26	132/90				
125	6/18/26	130/75	No specimen	Edema of feet and ankles	Faint trace	
	7/16/26	115/78				Case dropped
126	6/18/26	130/90	No specimen	None	3%	Protein free diet, etc. Left city
127	6/18/26	130/86	No specimen	Headache and slight edema	Very faint trace	Left city
131	6/24/26	130/80	No specimen	None	2%	7/8/26 protein free diet
	7/22/26	125/80	Negative		1-2%	9/2/26 full term asphyxiate fetus
132	6/24/26	225/90	Albumin—trace	Headache	4%	
134	6/25/26	120/80	No specimen	None	1%	
	7/ 9/26	132/90	Negative	Constant abdominal pain	0	
159	7/ 6/26	160/108	No specimen	Nausea and headaches	Trace	Protein free diet, etc.
	8/ 3/26	130/85	No specimen	None	0	Not pregnant
165	7/13/26	180/130	No specimen	Headache, edema of feet and ankles and constipation	3%	Protein free diet, etc.
166	7/16/26	160/75	No specimen	Slight headache, edema of feet and ankles and nosebleed	Very faint trace	Protein free diet, etc.
	8/ 6/26	138/70	Negative	Frontal headache and edema		
101	6/ 4/26	130/74	No specimen	None	2%	Left clinic
67	5/11/26	125/70	No specimen	Nausea, frontal headaches and constipation	0	
	7/20/26	130/60	Negative	None	1%	
	8/ 3/26	120/76	Negative	None		

TABLE II. APPARENTLY NORMAL CASES WITH EVIDENCE OF RETENTION

DATE	B. P.	URINE	SYMPTOMS	TEST	COMMENT
4/10/26 4/21/26	120/70 125/75	No specimen	Frontal headaches	Very faint trace	
5/11/26	118/74	No specimen	Frontal headaches, constipation and dizziness	Very faint trace	5/27/26 Not pregnant Prob. fibrosis uterus
5/18/26 6/ 1/26 8/12/26	120/62 124/70	No specimen	Nausea, headaches and edema	3%	Eight weeks postpartum
5/18/26 5/25/26 7/19/26	116/60 120/65 110/60	No specimen Albumin +	Nausea, headaches, constipation and edema of feet and ankles. Also choking sensation	2%	
5/20/26 7/. 1/26	110/60 108/68	No specimen Negative	None	Faint trace	
6/ 1/26	108/66	No specimen	None	2%	Left clinic
6/ 1/26	126/80	No specimen	Nausea, headaches and edema	2-3%	
6/ 4/26	112/76	No specimen	None	Very faint trace	

TABLE II—CONT'D

DATE	B. P.	URINE	SYMPTOMS	TEST	COMMENT
6/11/26	120/80	No specimen	Constipation	Trace	
7/30/26	113/58	Negative			8/ 2/26 Dead fetus 36 wk.
6/25/26	124/80	No specimen	Nausea and headaches	2%	
7/11/26	122/78	No specimen	None	2%	
7/ 8/26	124/75	No specimen	Constipation	Very faint trace	
7/ 8/26	120/80	No specimen	None	1-2%	
8/ 5/26	120/70				
4/30/26	124/80	No specimen	Frontal headache	Faint trace	
8/27/26	110/70	Negative	None		
5/11/26	118/64	No specimen	Nausea, headaches and constipation	Very faint trace	
7/20/26	100/60	Albumin +	None	0	
8/ 3/26	100/65	Negative			
5/18/26	130/80	No specimen	Nausea, headache and edema Also pain in back	Trace	
8/17/26	130/80	Negative		Trace	8/21/26 Normal delivery
6/10/26	105/60	No specimen	None		
9/ 2/26	115/75	Negative		2-3%	9/18/26 Normal delivery
6/11/26	112/60	No specimen	Nausea and constipation	2%	
10/ 1/26	110/70	Negative			10/ 9/26 Normal delivery

solution of bromsulphalein in sterile ampules* was injected into the vein of one arm; at the end of one-half hour a sample of blood was withdrawn from the vein of the opposite arm. The serum obtained was matched with standards† already prepared. In the case of hemolysis or cloudy serum the use of acetone to clear the serum recommended by Bloom and Rosenau[16] was found to be effective.

The test was given to patients of the Obstetric Clinic of the University Hospital at their first appearance regardless of blood pressure and symptoms. These patients were watched until delivery. When their blood pressure rose, or when after being under treatment and their symptoms either improved or became worse, the test was repeated. This plan was followed whenever possible with the hope that the liver function test might show interesting findings.

A total of 174 patients received the bromsulphalein, and a total of 215 injections was given. No reactions immediate or delayed, local or systemic, and no thrombosis developed. In three cases where the dye was injected into the surrounding tissue or leaked out of the vein local fibrosis was produced. These findings lead me to believe that bromsulphalein is absolutely safe in the doses employed. King also using the same dose found the same to be true.‡

Sixty-two cases have been followed from the time they first entered the clinic until they were discharged as delivered or left clinic before delivery, or were not pregnant. All these cases were normal and showed normal elimination at the end of one-half hour and through the entire pregnancy did not show any abnormal rise in blood pressure. Two of these cases were not pregnant and four left the clinic before delivery.

There were twenty-six cases of hypertension with normal elimination of bromsulphalein. The highest systolic B.P. was 175, while 21 cases started with systolic B.P. 130-140; 2 cases B.P. 140-150; 1 case 150-160; 2 cases 170-180. All cases responded to the routine treatment of low protein diet, magnesium sulphate and forced water, 16 cases returning to normal B.P. and the others had their B.P. materially lowered. One case in this group proved to be epilepsy. One case not pregnant, 3 cases left clinic before delivery, and the rest all had normal deliveries. It is difficult to interpret these results. It perhaps does point to the fact that B.P. is not a true index to the degree of toxemia; that this is perhaps a group of very mild cases, which apparently show no liver damage and react well to the routine treatment. This group perhaps indicate a favorable prognosis, although the physician must treat them as potential preeclamptic toxemias.

Table I includes 42 cases with hypertension and with varying de-

*Bromsulphalein in ampules from Hynson, Westcott and Dunning.
†Artificial Standards prepared by Hynson, Westcott and Dunning.
‡Personal communication.

TABLE III. HYPERTENSION WITHOUT RETENTION OF BROMSULPHALEIN (NEPHRITIC)

DATE	B.P.	URINE	SYMPTOMS	COMMENT
4/15/26	120/ 85	No specimen	Nausea and headache	
4/24/26	140/ 85			
5/13/26	134/ 85	Albumin-trace		
6/11/26	170/ 90		Headache	Not pregnant.
4/16/26	210/120	No specimen	Slight headache, edema of feet and ankles	Protein free diet, etc.
4/30/26	200/126	Negative		
5/ 3/26	200/120	Negative	Headache and slight edema	Protein free diet, etc.
5/18/26	210/120	Negative		Extravenous injection of dye.
5/18/26	190/100	No specimen	Nausea and headache	Previous pregnancy interrupted at 36 weeks for nephritic toxemia. 5/20/26 delivered 15 wk. fetus.
6/15/26	180/140	No specimen	Nausea, headache, nosebleed, and edema	7/15/26 pregnancy interrupted for nephritic toxemia.
6/18/26	180/130	Albumin ++	Headache and edema of feet	

TABLE IV. HYPEREMESIS GRAVIDARUM

DATE	GEST.	B.P.	URINE	SYMPTOMS	TEST	COMMENT
5/25/26	8 wks.	110/60	5/22 Albumin negative Acetone ++++ Diacetic trace	Persistent vomiting.	1%	5/19/26 pregnancy interrupted. When test was done patient was taking food. Previous pregnancy interrupted for same cause.
7/ 1/26	12 wks.	108/70	No specimen	Persistent vomiting, weakness and constipation.	Trace	Patient recovered under treatment.

TABLE V. VOMITING

AUTHOR	TEST	NO. NEUROTIC CASES	NO. TOXIC CASES
Krebs and Dieckman	Neg.	1	
	Pos.		1
Rosenfield and Schneiders	Neg	2	
	Pos.		5
E. L. King	Pos.		3
Total		3	9

TABLE VI. ECLAMPSIA

DATE	GEST.	B. P.	URINE	SYMPTOMS	TEST	COMMENT
8/17/26	2 days P. P.	140 /82	8/15 Albumin +++ Acetone + Diacetic-trace Casts + R. B. C. +++		Trace	8/15/26 patient had 6 convulsions before admission to hospital, 4 convulsions after admission. B. P. on admission 154/120. Patient received 3 doses 20 c.c. Mg. sulphate 20 per cent. Intravenous. Venesection 950 c.c. Recovered.
8/19/26	37 wk.	142/ 90	Albumin +++ Casts—many granular		1 %	Patient had 7 convulsions before admission, 5 convulsions after admission. Received 4 doses 20 c.c. Mg. sulphate 20 per cent intravenous. High colonic irrigation, morphia. Test performed after first dose of Mg. sulphate. N. P. N. 26 mg. Recovered.
8/20/26	Intrapartum	120/ 88	Bloody		Trace	Patient admitted 8/20/26, 2:50 A.M. She received 2 doses 20 c.c. Mg. sulphate 20 per cent intravenous. Test done at 11:20 A.M. 7 convulsions. Patient recovered.
8/27/26	32 wk.	205/140	8/24 Albumin ++++ Casts—few	Headache, blurred vision and generalized edema. No convulsions.	1-2%	Patient admitted to Med. General Hospital. B. P. 180/125. P. S. P. 48 per cent first hour. Blood urea 30 mg. Cesarean section 8/25/26. 8 months' fetus—lived.
9/ 7/26	34 wk.	160/110	9/6 Albumin ++ Casts—occasional	Headache, blurred vision and edema of feet and ankles.	2-3%	Admitted to hospital 9/14/26. B. P. 140/105 and given 1 dose 20 c.c. Mg. sulphate 20 per cent. 9/6/26 B. P. 170/116. Venesection 500 c.c. 9/8/26 spontaneous delivery—live child. Recovered.
10/ 8/26	Term	170/114	10/10 Negative		3 %	Patient admitted with convulsions—3 in number. Delivered of twins, first, low forceps, second, version. 1 postpartum convulsion. Venesection 500 c.c. Both twins died. Patient recovered.

All deliveries normal or otherwise noted.

grees of liver involvement as indicated by retention of bromsulphalein. Three cases started with normal blood pressure and negative test, but subsequently the blood pressure rose and evidence of liver impairment was found. (Cases 5, 70, and 67.) Nine cases (36, 45, 46, 110, 111, 159, 14, 131, and 119) showed improvement of liver function under treatment. Nine cases showed increase in liver damage with elevation of blood pressure (5, 14, 32, 53, 63, 70, 84, 86, and 87). One case (74) with lowering of blood pressure showed no improvement of liver function. Four cases (90, 98, 118, and 134) showed decrease in retention of bromsulphalein despite rise in blood pressure. This group of cases seems to again point to the fact that blood pressure is not a true guide as to the degree of liver function impairment; that liver function test is perhaps a better aid than blood pressure as to the condition of patient and response to treatment; and that it perhaps grades the type and severity of the toxemia and thereby may be a valuable aid as to prognosis and need for surgical interference.

Table II includes 17 cases with normal blood pressure and with evidence of liver function impairment. Twelve of these cases had symptoms. None of the cases subsequently showed increased blood pressure. Perhaps one may gather from this that the liver impairment is mild and that nature can handle it pretty well.

Table III shows six cases of nephritic type with hypertension and no apparent liver impairment. This finding has been substantiated by a number of other investigators and must certainly prove valuable in differentiating nephritic toxemia from preeclamptic and eclamptic toxemia. The total number of cases of other writers who agree with this finding are fourteen (Krebs and Diekmann two cases, Smith eight cases, King four cases).

Table IV represents two cases of persistent vomiting with liver function impaired; one case having had to have her uterus emptied.

Table V includes a number of cases reported by other workers showing that in the neurotic type of vomiting there is no impairment of liver function, whereas in the toxic type there is evidence of liver damage. I agree with the others that liver function test is valuable in differentiating the neurotic from the toxic type of vomiting and is likewise a guide as to the efficacy of treatment and when surgical procedures may be wise.

Table VI shows six cases of eclampsia all with mild retention and all recovered. The number of convulsions varied from none to 12.

Table VII includes a group of 15 cases from other writers showing seven cases of marked liver impairment with one death and eight cases of mild impairment with one maternal death; and this death seems to have been due more to the operation, since autopsy showed extremely little liver change. Liver function test in the case of eclampsia seems to indicate the degree of liver involvement and from

section 500 c.c. Both twins died. Patient recovered.
All deliveries normal or otherwise noted.

TABLE VII. ECLAMPSIA

AUTHOR	IMPAIRMENT MILD	IMPAIRMENT SEVERE	RESULT
Rosenfeld and Schneiders		1	Well
Smith	2	2	1 death 1 death Vaginal Hysterectomy
Trainor		2	
King	6	2	Well Well
Total	8	7	

that the prognosis of the patient may be determined; mild involvement regardless of the number of convulsions may mean a good prognosis, whereas severe involvement may mean a bad prognosis.

The following are the conclusions drawn by the writer from the results of other investigators as well as those of my own.

1. Bromsulphalein is valuable as a liver function test and eliminates the dangers of phenoltetrachlorphthalein.

2. Blood pressure is not perhaps a true guide as to the toxic state of the patient. Hypertension without impairment of liver function may mean a good prognosis. Retention of bromsulphalein with normal blood pressure indicates perhaps a mild type of involvement which needs watching but seems to take care of itself.

3. It is valuable in preeclamptic cases in classifying the degree of toxicity and reaction to treatment.

4. Valuable in differentiating nephritic from preeclamptic and eclamptic toxemia.

5. Useful in differentiating neurotic from toxic vomiting and as a guide to results of treatment and need for surgical interference.

6. Perhaps useful as an aid in prognosis in eclamptic cases.

I am indebted to Dr. J. M. H. Rowland for his permission to carry out this investigation and for his helpful suggestions.

REFERENCES

(1) *Rowntree, etc.:* Johns Hopkins Hosp. Bull., 1913, xxxiv, 327. (2) *Rosenthal, S. M.:* Johns Hopkins Hosp. Bull., 1922, xxxiii, 432. (3) *Rosenthal, S. M.:* Proc. Soc. Exper. Biol. and Med., 1922, xxi. *Rosenthal, S. M.:* Jour. Am. Med. Assn., Dec. 23, 1923, lxxix. (5) *Ottenberg and Rosenfeld, Goldsmith:* Arch. Int. Med., 1924, xxxiv. (6) *Levin-Ryney D'Amory:* South. Med. Jour., Nov., 1924, xvii. (7) *Boardman and Shoonmaker:* Am. Jour. Med. Sc., 1924, clxviii, 688. (8) *Bull and Bauman:* Surg., Gynec. and Obst., 1925, xl, 411. (9) *Mayo, Wm. J.:* Am. Surg., Gynec. and Obst., 1926, xliii, 46. (10) *Rowntree, L. G.:* Tr. Assn. Am. Phys., 1925, xl, 376. (11) *Shattuck, H. F.:* Med. Clin. N. Am., 1925, xix, 601. (12) *Maurer and Gatewood:* Jour. Am. Med. Assn., March 28, 1925, 935. (13) *Rosenau, W. H.:* Jour. Am. Med. Assn., 1925, lxxxv, 2017. (14) *Rosenthal and White:* Jour. Am. Med. Assn., 1925, lxxxiv, 1112. (15) *Rosenthal:* Jour. Am. Med. Assn., 1924, lxxxiii, 1049. (16) *Bloom and Rosenau:* Jour. Am. Med. Assn., Feb. 16, 1924, 54. (17) *Trainor, A. C.:* Can. Med. Assn., 1924, xiv, 511. (18) *Williams, P. F.:* AM. JOUR. OBST. AND GYNEC., 1922, xiv, 26. (19) *Rosenfeld and Schneiders:* Jour. Am. Med. Assn., 1923, lxxx, 743. (20) *Krebs and Dieckman:* AM. JOUR. OBST. AND GYNEC., 1924, xvii. (21) *Smith, J. A.:* AM. JOUR. OBST. AND GYNEC., 1924, viii, 298. (22) *King, E. L.:* AM. JOUR. OBST. AND GYNEC., 1926, xii, 577.

1720 EUTAW PLACE.

DIABETES MELLITUS AND PREGNANCY

By H. J. Stander, M.D., and C. H. Peckham, M.D., Montreal, Que.
(From the Department of Obstetrics, Johns Hopkins Hospital and University)

FOR many years following the appearance of Duncan's paper in 1882, diabetes was regarded as one of the most serious complications of pregnancy. In 1909, Williams stated that its gravity had been overestimated, yet at present there exists a great divergence of opinion concerning its importance as a complication of pregnancy and one meets with conflicting statements as to its significance. There are, however, certain points about which there is a general consensus of opinion; namely, that only a small number of diabetic women, perhaps not over 5 per cent, become pregnant; there is a high incidence of abortion or premature labor; when labor progresses to term the children are usually above the average in size; hydramnios seems to be a frequent complication; and the presence of sugar can usually be demonstrated in the amniotic fluid.

Vignis and Barbaro believe that diabetes developing during pregnancy is not so grave a complication as when it existed prior to conception, and in the latter case that the prognosis is especially unfavorable. Weiner also regards it as a very grave complication, and he states that the strain of pregnancy is severe on the pancreas. He holds that it cannot be warded off by insulin, and that women suffering from severe or moderately severe diabetes should not become pregnant, and when they do, that early interruption is indicated. Umber and others have also reported disastrous results in pregnancy complicated with diabetes.

On the other hand, certain authors do not agree with this contention. The work of both Morriss, and Rowley shows that at birth the maternal blood sugar is higher than the fetal. The latter author, as well as Brigham, believes that insulin will reduce to practically nothing the grave dangers of pregnancy complicated by diabetes. Lubin states that mild diabetes is often not aggravated by pregnancy, while Peters reports a case of diabetes which was carried to near term with insulin without serious results. As the entire literature upon the subject has recently been summarized by Lambie, the reader is referred to his article for further literary details.

It is because of this difference of opinion, that we have been interested in studying the metabolism of several diabetic patients during the course of repeated pregnancies. An attempt has been made to have the patient in the hospital for a period of two weeks at intervals during her pregnancy, in order that one may gain fairly accurate information as to the diabetic condition. She is studied not only during the pregnancy, but also for as long a period as possible after delivery. It should be remembered that our conclusions are not based on the study of a single pregnancy, but upon the data obtained during the course of four or five consecutive pregnancies in the same individual.

TABLE I. METABOLISM CHART OF FOURTH PREGNANCY OF PATIENT 1

(Similar Charts Were Employed in All of Our Studies)

DATE 1926	URINE						BLOOD			DIET ORDERED			DIET RECEIVED		
	C.C.	SUGAR %	SUGAR GM.	ACETONE	DIACETIC	TOTAL N.	SUGAR	N. P. N.	CO_2	P.	F.	C.	P.	F.	C.
Jan. 12	1320	.71	9.4	0	0	7.4	.147	31.5	48.0	50	160	70	50.0	161.0	69.0
13	295	.65	2.0	0	0	2.6				40	140	58	41.0	140.0	55.0
14	920	.78	5.8	0	0	8.7				40	140	58	40.8	140.0	59.0
15	780	.59	4.6	0	0	11.0	.145	33.0	44.0	40	140	58	32.0	98.0	38.0
16	840	.72	5.85	0	0	4.3				40	140	58	39.0	127.0	53.0
Feb. 1	1280	.195	2.49	0	0	8.7				40	140	58	36.8	130.0	58.6
2	1265	.247	3.12	0	0	8.9				40	140	58	30.0	103.0	49.0
3	1080	.21	2.26	0	0	9.2				40	140	58	36.0	124.0	56.0
4	1020	.19	1.93	0	0	6.7	.154	30.0	50.5	40	140	58	41.0	140.0	58.0
5	780	.39	3.04	0	0	8.2				40	140	58	34.0	117.0	53.0

TABLE I.—CONT'D

DATE 1926	DIET METABOLIZED						CAL. REQUIRED	CAL. RECEIVED	WT.	HT.	INSULIN
	P.	F.	C.	AV. GL.	AV. FA.	FA/G					
Jan. 12	46.25	156.0	59.6	102.0	160.7	1.6	1701	1985	88.6 K	164.7 cm.	0
13	16.25	151.9	52.9	77.5	143.9	1.9	1701	1697	85 K		0
14	57.37	136.7	53.2	98.4	146.9	1.5	1701	1712			0
15	68.75	83.8	33.4	81.6	105.6	1.3	1701	1198			0
16	26.88	134.9	47.1	76.2	133.2	1.7	1701	1558			0
Feb. 1	54.7	123.2	56.1	101.1	134.9	1.3	1701	1600	85.5 K		45
2	55.6	93.1	45.9	87.5	108.2	1.3	1701	1281			45
3	57.7	126.2	53.7	98.8	139.0	1.4	1701	1530			45
4	41.9	140.5	56.1	94.4	144.9	1.5	1701	1708			45
5	51.1	110.8	50.0	90.7	122.2	1.4	1701	1445			45

We have studied in detail three diabetic women,—two of whom presented four consecutive pregnancies, and one five consecutive pregnancies.

During all of our studies, the patient was in bed and upon a carefully regulated diabetic diet. Daily determinations were made of the amount of sugar, acetone, diacetic acid and total nitrogen in the urine, while the blood was analyzed at frequent intervals for non-protein nitrogen, sugar, and CO_2 combining power. The amount of food taken by the patient was carefully recorded and a complete metabolism chart kept. As it would require too much space to re-

TABLE II. (Case No. 1.—Patient H. M., Unit 1948, Born 1883, Colored)

PREGNANCY	DATE	DURATION	URINE SUGAR	BLOOD SUGAR	F.A./G.	REMARKS
I	1916	Term	----	----	---	Normal delivery. Child living.
II	11/26/17	Term	0	----	---	Suffered from preeclampsia. Normal delivery. Child living.
III	6/ 8/23	4½ mo.	12.8 gm.	0.194	1.6	In July, 1919, it was discovered that the patient had diabetes, with 33 gm. of sugar in the urine, on admission to the Medical Clinic. She received treatment with insulin for 2 mo. and was discharged with no sugar in urine and with a normal blood sugar.
	6/26/23	5 mo.	2.3 gm.	0.167	1.5	
	7/10/23	6 mo.	22.5 gm.	----	---	
	7/12/23	6 mo.	0	0.182	---	
	7/24/23	+6 mo.	20.7 gm.	----	---	
	7/27/23	6½ mo.	0	----	---	Spontaneous premature delivery of stillborn child, premature separation of placenta. Patient was discharged 8/28/23 and was then lost track of until in the subsequent pregnancy in 1925, as shown below.
	7/28/23	1 day p.p.	Faint trace	0.207	---	
	8/28/23	1 month p.p.	14.4 gm.	----	---	
IV	1/12/26	3½ mo.	9.4 gm.	0.147	1.6	No acetone or diacetic acid.
	2/ 5/26	4½ mo.	3.0 gm.	0.154	1.4	Discharged after getting 45 units insulin a day for past 2 weeks.
	3/10/26	5½ mo.	1.0 gm.	0.153	1.6	Receiving 40 units insulin a day.
	5/ 1/26	+7 mo.	1.2 gm.	0.091	1.6	Receiving 38 units insulin a day.
	5/19/26	8 mo.	1.9 gm.	0.095	1.4	Receiving 38 units insulin a day.
	6/ 5/26	9 mo.	0	0.118	1.1	*No* insulin since 6/3/26.
	6/ 8/26	9 mo.	0	0.149	1.1	Labor induced because of vomiting. Child weighed 2750 gm., living.
	6/15/26	7 days p.p.	0	0.158	1.9	Vomiting stopped. Patient in good condition.
	6/18/26	10 days p.p.	No dextrose. Positive for lactose.	0.182	1.9	Discharged without insulin.

produce the complete charts of all the patients, we are giving the figures for two five-day periods (Table I) during one of the admissions of H. M., in the hope that it will give an idea as to how our determinations were made. The data from all the charts have been condensed into tables and are shown in Tables II, III and IV. Each of these three tables records the essential data observed in the consecutive pregnancies of the same woman. The data as to parity and the duration of pregnancy are given in order that one may follow the progress of each pregnancy. The amount of sugar in the urine, in grams wherever possible, otherwise in percentage, as well as the blood sugar in percentage are then given. The column "FA/G" represents the ratio of fatty acids to glucose as metabolized by the patient, and, of course, is of the greatest value in evaluating the

TABLE III. (Case No. 2.—Patient J. S., Unit 2840, Born 1887, White)

PREGNANCY	DATE	DURATION	URINE SUGAR	BLOOD SUEAR	F.A./G.	REMARKS
I	9/ 7/15	Term	0			Normal delivery. Child living.
II	1917	Term	0			Normal delivery following a mild toxemia of pregnancy. Child living.
	3/30/20	Not pregnant	0.3%	0.194		Glycosuria first noted 1/1/20. Acetone and diacetic positive. Treated in Medical Department.
III	5/ 4/20	Not pregnant	16 gm.	0.217		She reports to Metabolism Clinic.
	9/29/20	3 mo.	5 gm.			During this pregnancy she attended the Dispensary every 2 weeks. Her urine remained sugar and acetone free throughout latter part of the pregnancy.
	10/23/20	4 mo.	0	0.084		
	11/12/20	5 mo.	0	0.090		
	3/ 9/21	Term	0			Normal delivery. Child living, weight 3930 gm.
	3/21/21	12 days p.p.	0			Discharged in good condition.
IV	6/ 5/23	Not pregnant	0.1%			She has been visiting the Metabolism Clinic regularly. Diet: P. 60; F. 115; C. 50.
	5/13/24	1 mo.	6 gm.			No acetone. Diet: P. 60; F. 150; C. 45.
	8/12/25	4 mo.	4.6 gm.	0.174		Acetone +; Diacetic 0.
	9/ 7/24	5 mo.	0	0.187	1.5	Diet: Glycerine + P. 70; F. 155; C. 50.
	11/11/24	7 mo.	0	0.122	1.5	Acetone +; Diacetic +; Diet as above.
	1/ 6/25	+ 8½ mo.	0			Acetone and Diacetic negative. Diet same.
	1/20/25	– Term	0	0.121		Normal delivery. Child living. Weight 4670 gm. Acetone 0.
	1/23/25	3 days p.p.	0	0.118		Acetone-free.
	3/ 3/25	1½ mo. p.p	0			Acetone-free.
	7/14/25	6 mo. p.p	7.5 gm.			Patient has been making regular visits to the Metabolism Clinic and is adhering fairly well to prescribed diet.
	7/27/26	1½ yr. p.p.	6.8 gm.			

patient's condition. Under "Remarks" we give a brief and concise outline of the clinical condition, as well as such further information as may aid one in following the progress of the pregnancy and the diabetes.

CASE 1.—The patient, H. M. (Table II), had severe diabetes. Her third pregnancy terminated in premature delivery at 6½ months, and she was discharged one month later with a high blood sugar level and sugar in the urine. Her condition during this pregnancy was decidedly unfavorable. The following (fourth) pregnancy was studied in detail and the carbohydrate metabolism was carefully determined at regular and frequent intervals. During this pregnancy, the findings, as summed up in the latter part of Table II, clearly indicate that the diabetic condition started to improve during the fourth or fifth month of pregnancy, and the improvement continued up to term. The patient was discharged 10 days after delivery without dextrose in the urine, but with an elevated blood sugar.

CASE 2.—The patient, J. S., was studied during four consecutive pregnancies, and probably developed diabetes after second pregnancy. The urine and blood determinations, as shown in Table III, indicate that in both the third and fourth pregnancies, the diabetic condition improved at about the fourth or fifth month and that the improvement continued up to term. At the time of both labors, the urine was sugar-free and the blood sugar at a normal level. This relatively satisfactory condition continued for over two months postpartum, but when the patient was seen six months after delivery, the diabetes had returned. It will also be noted that although the urine was positive for both acetone and diacetic acid during the early months of pregnancy, both substances disappeared from the urine as term was approached.

CASE 3.—The patient, M. M., was observed during five consecutive pregnancies. In 1916, shortly after the third pregnancy, it was discovered that she had diabetes mellitus, with a blood sugar of 0.237 per cent and 4 per cent of sugar in the urine. She received treatment in the Medical Clinic and improved rapidly. We were unable to follow her during the following or fourth pregnancy, but carried out repeated metabolism studies during the last, or fifth pregnancy. Our findings are summarized in Table IV. From their study it will be seen that when the patient was first observed at the seventh month of her fifth pregnancy, she had a high blood sugar and almost 4 grams of sugar in the urine. From that time on, her condition continued to improve so that a few days before delivery the blood sugar was within normal limits and the urine was sugar-free. It must, however, be pointed out that we had increased the amount of insulin from 10 units to 30 units a day; but as shown in the postpartum studies, the patient remained sugar-free and with a normal blood sugar for 8 months, although at that time she was receiving no insulin.

Before entering into a general discussion of our results, we wish to report a study of a mild case of diabetes mellitus. Several workers have stressed the necessity of careful diagnosis of a glycosuria developing during pregnancy, and of differentiating lactosuria, alimentary glycosuria, or renal glycosuria due to a kidney hyperpermeable to glucose, from true diabetes mellitus. We believe that, in this last case, the presence of a slightly elevated blood sugar and of acetone bodies in the urine three months postpartum indicate that we had to deal with a true, though mild diabetes.

TABLE IV. (Case No. 3.—Patient M. M., Unit 2103, Born 1888, White)

PREGNANCY	DATE	DURATION	URINE SUGAR	BLOOD SUGAR	F.A./G.	REMARKS
I	1906	Term	0			Normal delivery. Child living.
II	1914	Term				Normal delivery. Child living. Considerable edema and headache.
III	1916	Term	?			Normal delivery. Child living. Two months later patient admitted to medical clinic with diagnosis of diabetes; blood sugar 0.237 and 4% sugar in urine, with acetone and diacetic present. Treated and discharged with urine sugar free and blood sugar 0.109.
IV	1922	Term				Normal delivery. Child stillborn. In 1918 patient was in medical clinic and urine was sugar-free.
	2/18/25	7 mo.	3.72 gm.	0.182	1.9	She had been referred to metabolism clinic 2/10/25, when 23 gm. sugar were found in 24 hour urine specimen. Receiving 10 units insulin a day.
V	2/25/25	7¼ mo.	1.98 gm.	0.121	1.6	Receiving 10 units insulin a day.
	3/ 3/25	7½ mo.	Faint trace	0.124	1.7	Receiving 20 units insulin a day.
	4/19/25	+9 mo.	0	0.118	1.6	Receiving 30 units insulin a day.
	4/21/25	In labor	0		1.6	Labor induced (bag). Child living. Weight 3090 gm. Receiving 30 units insulin a day.
	7/28/25	3 mo. p. p.	0	0.116		Receiving 24 units insulin a day.
	1/21/26	9 mo. p. p.	0	0.093	1.1	Receiving *no* insulin.

TABLE V. (Case No. 4.—Patient M. J., Unit 4123, Born 1899, White)

PREGNANCY	DATE	DURATION	URINE SUGAR	BLOOD SUGAR	F.A./G.	REMARKS
I	4/21/26	3 mo.	8.8 gm	0.143	1.1	Diet: P. 47; F. 67; C. 108; acetone and diacetic negative throughout this month.
	4/28/26	+3 mo.	1.9 gm	0.133	1.2	
	6/28/26	+5 mo.	0	0.143		Acetone and diacetic negative.
	10/12/26	Term	0			Low forceps delivery. Child normal, 3398 gm. Acetone and diacetic negative.
	10/15/26	3 days p. p.	0	0.087	1.6	No insulin throughout the pregnancy.
	1/11/27	3 mo. p. p.	0	0.130		Diacetic and acetone both positive. CO_2 63.3 vol. per cent.

CASE 4.—The patient, M. J., was first seen in the Prenatal Service on April 13, 1926, when she was about 3 months pregnant. She had been told by her private physician that she had sugar in the urine. We studied her throughout this pregnancy and the findings are summarized in Table V. She was kept on a diabetic diet throughout the pregnancy, as well as for three months following the delivery of a normal child at term. From the data reported, it will be seen that at about the fifth month of pregnancy the urine became sugar-free, although the blood sugar was slightly elevated. At term, the urine was still without sugar and the blood sugar was at a normal level. The postpartum studies showed that the urine re-

mained negative for sugar, although the blood-sugar level gradually rose and acetone and diacetic acid appeared in the urine. It is thus fairly evident that at about the fifth month of pregnancy the diabetic condition improved, that at term the patient was without signs or symptoms of diabetes, and that this condition persisted for some time into the puerperium.

DISCUSSION

In 1911, Carlson and Drennan reported experiments relating to the control of pancreatic diabetes in pregnancy. They found that in eight to sixteen hours after pancreatectomy in normal dogs, glycosuria appears, reaching a high point within twenty-four to thirty-six hours post operationem. Identical results were also obtained in early pregnancy, but in dogs at or near term, no sugar appeared in the urine following operation. (But within fourteen hours following delivery by abdominal section, sugar reappeared in the urine.) Two years later Lafon suggested that the absence of glycosuria in depancreatized dogs at term was due to the passage of fetal hormones to the mother and that the fetuses were able to dispose of the excess of maternal blood sugar by oxidation or storage without any embarrassment to their own carbohydrate metabolism. In 1916, Falco endeavored to explain the results of Carlson and Drennan on the supposition that the surplus of maternal blood sugar is metabolized by placental ferments.

Dubreuil and Anderodias reported the case of a diabetic mother who gave birth at the eighth month to a 5000 gram child, whose pancreas showed huge masses of Island of Langerhans tissue. They thought that the continual passage of blood sugar from mother to fetus accounted for the size of the child, as well as for the increase in the amount of island tissue, which they believed developed for the protection of the child against hyperglycemia. Holzbach likewise reports a case of pregnancy associated with edema, hydramnios, ketonuria, glycosuria and a blood sugar of 0.120 per cent. Upon the death of the child in utero the blood sugar rose to 0.210 per cent and the sugar in the urine increased from 10 to 44 grams. At birth the child was stillborn and weighed 4200 grams.

It is essential that the mother be under observation for a period of two or more years after the delivery before we can draw any definite conclusions as to the effect of pregnancy on the course of diabetes mellitus. Springer quotes Colorni as stating that 46 per cent of diabetic mothers die during the first two years postpartum, but the data here presented show that this has not been our experience. From a consideration of the experimental results and of our clinical evidence it appears that pregnancy, particularly during its latter half, may be associated with a change in the maternal carbohydrate metabolism, with the result that in the diabetic, the tendency towards hyperglycemia may be decreased or even disappear during the latter half

of pregnancy. How this is brought about we do not know, but the factors responsible for this may be a pancreatic hormone coming from the fetus, a greater demand by the fetus for maternal carbohydrates, or some other as yet unknown mechanism. The work of one of us on the respiratory exchange of the fetus suggests that the fetus uses, at least when near term, carbohydrates for its source of energy, and we have pointed out that there is an unusual demand on the maternal sugar by the fetus.

SUMMARY

Metabolism studies on three patients who suffered from diabetes during repeated and consecutive pregnancies, as well as on a mild diabetic patient in a single pregnancy, were conducted at regular intervals during the state of gravidity, as well as during the puerperium and later. In order to evaluate the severity of the diabetic complication, a complete diabetic chart, as used in this hospital and as shown in Table I, was carefully kept in each case. The main items of these charts, viz., the urine sugar, the blood sugar and the fatty acid to glucose ration (F.A./G.) are summarized for each patient in the several charts, which also contain the information as to the presence or absence of acetone and diacetic acid in the urine, and as to the patient's diet and treatment. The amount of sugar in the urine, the presence or absence of acetone and diacetic acid, the blood-sugar level and the F.A./G. ratio give us a fairly good index of the diabetic condition. Reference has been made to some of the important clinical and experimental findings reported by other workers.

CONCLUSIONS

1. The diabetic woman may undergo a change for the better during the second half of pregnancy.

2. This improvement may be due to the action of fetal pancreatic hormone, to an excessive utilization of maternal carbohydrate by the fetus, as well as to some as yet unknown change in the maternal carbohydrate metabolism which takes place in the latter stages of gravidity.

3. Under careful hospital supervision as to diet, with frequent urine and blood analyses, and with insulin treatment if necessary, the diabetic patient may often go to term and be successfully delivered of a living child, without aggravation of the diabetic condition or indeed with a temporary disappearance of all symptoms during a part of the period of lactation. Of course, it would be unwise to anticipate such an outcome in extremely advanced cases of diabetes.

4. In patients with diabetes mellitus the first half of pregnancy appears to be the precarious period for the fetus, and without any benefit to the mother.

5. The excessive size of children born of diabetic mothers is probably due to the increased supply of maternal blood sugar, as the fetus undoubtedly makes a heavy demand on the maternal carbohydrates not only for its sugar requirements but also in order to build its fat and to supply its own energy.

REFERENCES

Bell, J. N.: Am. Jour. Obst. and Gynec., 1922, iii, 20. *Brigham, E. G.:* N. Y. State Jour. Med., 1923, xxiii, 475. *Carlson, A. J., and Drennan, F. M.:* Am. Jour. Physiol., 1911, xxviii, 391. *Colorni:* Annali di Ostet. e Gyn., 1913. *Dubreuil, G. A., and Anderodias:* Compt. rend. de Soc. de Biol., 1920, lxxxiii, 1490. *Duncan:* Tr. London Obst. Soc., 1882, xxiv, 206. *Falco, A.:* Ann. di Ostet., 1916, i, 1. *Henneberg, H., and Bicke, G.:* Gynec. et Obst., 1925, xii, 72. *Holzbach:* Zentralbl. f. Gynäk., 1926, xli, 2610. *Lafon, G.:* Compt. rend. de Soc. de Biol., 1913, lxxv, 266. *Lambie, G. C.:* Jour. Obst. and Gynec., Brit. Emp., 1926, xxxiii, 566. *Lubin, A.:* Deutsch. Arch. f. Klin. Med., 1923, cxliii, 342. *Morriss, W. H.:* Johns Hopkins Hosp. Bull., 1917, xxviii, 140. *Peters, L.:* Cal. and West. Med., 1925, xxiii, 1300. *Rosenberg, M.:* Klin. Wehnschr., 1924, iii, 1561. *Rowley, W. N.:* Am. Jour. Obst. and Gynec., 1923, v, 23. *Springer, A.:* Zentralbl. f. Gynäk., 1924, xlvii, 2642. *Springer, A.:* Wien. Klin. Wehnschr., 1925, xxxviii, 1108. *Stander, H. J.:* Am. Jour. Obst. and Gynec., 1927, xiii, 39. *Umber, F.:* Deutsche med. Wehnschr., 1920, xlvi, 761. *Vignis, H., and Barbaro, G.:* Presse. Med., 1924, xxxii, 1018. *Wiener, H. J.:* Am. Jour. Obst. and Gynec., 1924, vii, 710. *Williams, J. W.:* Am. Jour. Med. Sc., 1909, cxxxvii, 1.

COMPARATIVE STUDIES ON BLOOD CHOLESTEROL IN WOMEN

By Isadore Rosen, M.D., and Frances Krasnow, Ph.D.
New York, N. Y.

(From the Sloane Hospital for Women and the Laboratory of Biological Chemistry of Columbia University at the College of Physicians and Surgeons)

During the course of an investigation on the blood cholesterol in syphilis, 37 of our cases were pregnant women. The cholesterol content in 60 per cent of these showed a high value, 35 per cent a normal value (140 to 179 mg. per 100 c.c. of whole blood) and 5 per cent a low value.[1] This suggested the desirability of ascertaining the cholesterol content of the blood in uncomplicated pregnancies and in pregnancies with complications other than syphilis. Data in the literature indicate, in general, a high cholesterol value during pregnancy.[2, 3, 4, 5, 6, 7, 8]

The present paper treats of the cholesterol content in the blood from normal nonpregnant women (medical students, showing no clinical signs of abnormality), pregnant women showing no clinical signs of abnormality, pregnant women suffering from toxemia and hypertension and pregnant women with syphilis. All determination, excluding those on the medical students, were made on ambulant clinic patients. This fact must be borne in mind because the regulation of the food intake plays an important part in the cholesterol found in the blood

and must be taken into consideration in the interpretation of the findings. The patients were allowed their usual diet. No attempt was made to select cases. The method used to determine cholesterol was essentially that of Myers and Wardell.[9]

An analysis of Table I shows that in 10, or 55 per cent, of the eighteen normal nonpregnant women the cholesterol content is between 140 and 179 mg. per 100 c.c. of whole blood, while 8, or 44 per cent, gave values between 180 and 200 mg. per 100 c.c. Let us compare these figures with those in Table II. Here we find that 87 per cent of the 32 normal men had a cholesterol content between 140 and 179 mg., only 12 per cent were between 180 and 187 mg. and none above 190 mg. per 100 c.c. of whole blood.

These two series seem to show that the blood cholesterol content in women is generally higher than in men, the latter approximating more nearly the values in the range "accepted as normal," i.e., 140 to 179 mg. per 100 c.c. of whole blood. If the cases listed in Tables I and II be considered as one group, then 38, or 76 per cent, of the 50 cases

TABLE I. CHOLESTEROL CONTENT OF WHOLE BLOOD IN NORMAL NONPREGNANT WOMEN (EIGHTEEN CASES)

SERIAL NO.	AGE	COLOR	BLOOD CHOLESTEROL MG./100 C.C.	SERIAL NO.	AGE	COLOR	BLOOD CHOLESTEROL MG./100 C.C.
5	23	W	153	29	23	W	175
28	20	W	153	41	22	W	182
18	21	W	157	37	22	W	186
3	23	W	159	41	22	W	190
13	20	W	164	44	30	W	194
38	23	W	164	39	23	W	197
19	24	W	167	20	22	W	201
12	23	W	169	40	22	W	201
4	22	W	174	49	21	W	201

TABLE II. CHOLESTEROL CONTENT OF WHOLE BLOOD IN NORMAL MEN (THIRTY-TWO CASES)

SERIAL NO.	AGE	COLOR	BLOOD CHOLESTEROL MG./100 C.C.	SERIAL NO.	AGE	COLOR	CHOLESTEROL BLOOD MG./100 C.C.
15	22	W	140	17	21	W	163
11	21	W	142	48	23	W	163
6	20	W	143	26	22	W	165
23	22	W	152	14	21	W	167
8	27	W	152	43	23	W	167
9	24	W	154	45	20	W	167
24	25	W	154	32	19	W	169
22	20	W	154	21	21	W	170
34	23	W	157	27	21	W	170
35	21	W	157	25	22	W	171
47	18	W	159	50	25	W	172
31	23	W	159	36	23	W	173
46	22	W	161	2		W	182
30	21	W	162	7	23	W	183
10	28	W	162	33	21	W	186
1	21	W	163	16	23	W	187

are between 140 and 179 mg. per 100 c.c. of whole blood, and 12, or 24 per cent, between 180 and 201 mg. per 100 c.c.

Tables III and IV show the results in 91 cases of normal pregnant women; 3 patients in the second month of gestation had a cholesterol content between 140 and 179 mg. per 100 c.c. of whole blood. Twelve were in the third month of pregnancy; 9, or 75 per cent, had a cholesterol content between 140 and 179 mg. per 100 c.c. of whole blood and 3, or 25 per cent, gave values between 180 and 200 mg. per 100 c.c. Eleven were in the fourth month of pregnancy. Of these 3, or 27 per cent, showed a blood cholesterol content between 140 and 179 mg. per 100 c.c.; 4, or 36 per cent, between 180 and 200 mg. per 100 c.c. and 4, or 36 per cent, above 200 mg. per 100 c.c. of whole blood. There were 19 cases in the fifth month of gestation; 7, or 37 per cent, had a cholesterol content between 140 and 179 mg. per 100 c.c. of whole blood; 5, or 27 per cent, between 180 and 200 mg., and 7, or 37 per cent, above 200 mg. per 100 c.c. Fifteen were in the sixth month of pregnancy; 5, or 33 per cent, of these gave cholesterol values between 140 and 179 mg. per 100 c.c. of whole blood; 3, or 20 per cent, between 180 and 200 mg., and 7, or 47 per cent, above 200 mg. per 100 c.c. Of the 20 cases in the seventh month of pregnancy, 3, or 15 per cent, showed a cholesterol content between 140 and 179 mg. per 100 c.c. of whole blood; 7, or 35 per cent, between 180 and 200 mg. and 10, or 50 per cent, above 200 mg. per 100 c.c. There were 6 cases in the eighth month of gestation; in 2, or 33 per cent of these, the cholesterol content was found to be between 180 and 200 mg. per 100 c.c. of whole blood; and in 4, or 66 per cent, it was above 200 mg. per 100 c.c. Five cases were in the ninth month of pregnancy. Of these 1 gave a cholesterol value in the range of 140 to 179 mg. per 100 c.c. of whole blood; 1 in the range of 180 to 200 mg., and 3 were above 200 mg.

These data indicate, although not conclusively, (1) that as pregnancy progresses the cholesterol content in whole blood increases; (2) that, in general, the cholesterol in normal pregnant women is greater than in normal nonpregnant women.

The data on pregnancies complicated with toxemia and hypertension are given in Tables V and VI. Three cases in the second month of pregnancy had a cholesterol content between 140 and 179 mg. per 100 c.c. of whole blood. Of 6 cases in the third month of gestation, 1 showed a cholesterol value below 140 mg. per 100 c.c.; 3 were between 140 and 179 mg. and 2 above 200 mg. per 100 c.c. of blood. We studied 1 case in the fourth month of pregnancy. It had a cholesterol value between 180 and 200 mg. per 100 c.c. of blood. The one case in the fifth month of pregnancy showed a cholesterol content between 180 and 200 mg. per 100 c.c. of whole blood. There were 3 cases in the sixth month of gestation. Here 1 case gave a cholesterol value be-

TABLE III. CHOLESTEROL CONTENT OF WHOLE BLOOD IN NORMAL PREGNANT WOMEN (NINETY-ONE CASES)

SERIAL NO.	AGE	COLOR	DURATION OF GESTATION (MONTHS)	BLOOD CHLOESTEROL MG./100 C.C.	REMARKS
61	26	b	2	139	
72	42	w	2	174	Miscarriage
47	25	w	2	175	
80	36	b	3	153	
90	21	w	3	155	
41	41	b	3	157	
17	29	w	3	158	
88	22	b	3	159	
43	31	b	3½	167	
92	34	w	3	170	
49	30	b	3½	171	
84	31	b	3	175	
9	25	b	3	186	
91	26	w	3	190	
27	37	w	3	200	
78	32	w	4	155	
99	38	w	4	161	
46	30	w	4½	165	
93	23	w	4	190	
59	27	w	4	194	
32	31	b	4	194	
81	26	b	4	200	
34	37	b	4	201	
64	19	b	4	206	
15	24	b	4	207	
76	32	b	4½	242	
11	25	w	5	153	
101	21		5	162	
133	34	w	5	163	
45	20	b	5	169	
57	19	w	5	176	
69	28	w	5	178	
24	24	b	5	178	
83	35	w	5	183	
51	30	b	5	189	
13	30	b	5	195	
85	31	b	5	197	
62	19	b	5	200	
97	30	b	5	201	
21	39	w	5	214	
96	22	w	5	214	
66	28	w	5	224	
18	42	w	5	250	
94	27	b	5	306	
95	36	w	5	326	
86	21	w	6	153	
67	36	b	6	163	
40	24	b	6	164	
5	21	w	6	172	
4	21	b	6	176	
25	26	b	6	196	
29	33	w	6	198	
77	18	w	6	200	
36	34	w	6	204	
38	20	w	6	204	
100	30	b	6	217	
26	29	w	6	226	
68	29	w	6	233	
12	32	w	6	238	

TABLE III—CONT'D

SERIAL NO.	AGE	COLOR	DURATION OF GESTATION (MONTHS)	BLOOD CHLOESTEROL MG./100 C.C.	REMARKS
63	19	w	6	238	
39	32	w	7	160	
14	27	w	7	174	
60	23	b	7	174	
58	17	w	7½	185	
7	29	w	7	190	
55	26	w	7	193	
22	32	w	7	193	
3	26	b	7	197	
98	25	w	7	200	
37	26	w	7	200	
87	33	w	7	202	
16	19	w	7	202	
50	29	w	7	205	
74	17	w	7	206	
79	22	w	7	208	
75	29	w	7	218	
53	29	w	7	218	
30	28	w	7	220	
60	23	b	7	226	
28	27	w	7	230	
19	28	b	8	186	
6	26	w	8	192	
8	26	w	8	203	
23	25	b	8	205	
52	32	w	8	215	
2	23	w	8	246	
10	35	b	9	175	
657 S.H.	28	b	9	189	
1	21	w	9	208	
706 S.H.	42	w	9	225	
20	19	w	9	244	

TABLE IV. SUMMARY OF CHOLESTEROL FINDINGS IN NORMAL PREGNANT WOMEN

	DURATION OF GESTATION							
	2 MO.	3 MO.	4 MO.	5 MO	6 MO.	7 MO.	8 MO.	9 MO.
Number of cases	3	12	11	19	15	20	6	5
Cholesterol values in mg. per 100 c.c. of whole blood:								
140 to 179	3	9	3	7	5	3	0	1
180 to 200	0	3	4	5	3	7	2	1
Above 200	0	0	4	7	7	10	4	3

tween 180 and 200 mg. and 2 cases above 200 mg. per 100 c.c. Of 8 cases in the seventh month, 1 showed a cholesterol content between 140 and 179 mg.; and 7, or 87 per cent, were above 200 mg. per 100 c.c. Four, or 66 per cent, of the cases in the eighth month of gestation had a cholesterol content above 200 mg., while 2, or 33 per cent, had a content between 140 and 179 mg. per 100 c.c. Twenty-nine cases were in the ninth month of pregnancy. Of these, 18, or 62 per cent, had a cholesterol content above 200 mg.; 4, or 14 per cent, gave a value between 180 and 200 mg.; and 7, or 24 per cent, between 140 and 179 mg. per 100 c.c. of whole blood.

TABLE V. CHOLESTEROL CONTENT OF WHOLE BLOOD IN PREGNANCIES COMPLICATED WITH TOXEMIA AND HYPERTENSION (FIFTY-SEVEN CASES)

SERIAL NO.	AGE	COLOR	DURATION OF GESTATION	BLOOD CHOLESTEROL MG./100 C.C.	REMARKS
653	28	w	2	159	Hypertension
697	38	w	2	169	
413	35	w	2½	174	Sl. hypertension; toxemia
421	24	w	3	92	Hypertension; nephritis
420	35	b	3	156	Hypertension; arteriosclerosis
495	31	w	3	158	Toxemia; jaundice
709	29	b	3	160	Hypertension, albuminuria
698	25	b	3	228	Hypertension
703	34	w	3	238	Hypertension
720	32	b	4	248	Albuminuria; arteriosclerosis with convulsions
654	28	w	5	192	Albuminuria
694	29	w	6	200	Hypertension
409	35	b	6	204	Hypertension; edema
546	23	b	6	231	Hypertension; nephritis
646	40	w	7	156	Hypertension; nephritis
718	42	b	7	206	Hypertension; ateriosclerosis; edema
442	20	w	7	216	Hypertension
689	40	b	7	216	Hypertension; toxemia
717	30	w	7	219	Hypertension
711	23	b	7	232	Hypertension
712	24	w	7	235	Hypertension
500	43	w	7	426	Sl. hypertension
692	23	w	8	146	Hypertension; toxemia
693	24	w	8	151	Hypertension
716	39	w	8	181	Hypertension; toxemia
655	22	b	8	206	Hypertension
422	41	b	8	240	Hypertension
715	35	w	8	246	Hypertension; albuminuria
487	29	w	9	153	Hypertension
432	32	w	9	155	Hypertension; goiter
454	26	w	9	160	Hypertension
488	33	w	9	160	Hypertension
443	21	w	9	162	Hypertension
550a	17	b	9	168	Hypertension
530	20	w	9	179	Hypertension
489	44	w	9	186	Hypertension
412	36	w	9	187	Hypertension
549	35	w	9	198	Hypertension
550	40	w	9	198	Hypertension
545	21	w	9	201	Hypertension
719	32	w	9	204	Hypertension
418	27	w	9	213	Hypertension
695	39	w	9	220	Hypertension
713	51	b	9	244	Hypertension; albuminuria
691	22	w	9	227	Hypertension toxemia
528	21	w	9	228	Hypertension
526	19	b	9	229	Hypertension
700	32	w	9	229	Hypertension; toxemia; albuminuria
684	40	w	9	231	Hypertension
683	27	w	9	232	Hypertension
543	34	w	9	234	Sl. hypertension
529	27	w	9	238	Hypertension
649	35	w	9	249	Hypertension
568	23	w	9	300	Hypertension
505	24	w	9	332	Hypertension
501	37	b	9	343	Anemia; hypertension
567	27	w	9	425	Hypertension

TABLE VI. SUMMARY OF CHOLESTEROL FINDINGS IN PREGNANCIES COMPLICATED WITH TOXEMIA AND HYPERTENSION (FIFTY-SEVEN CASES)

	DURATION OF GESTATION							
	2 MO.	3 MO.	4 MO.	5 MO	6 MO.	7 MO.	8 MO.	9 MO.
NUMBER OF CASES	3	6	1	1	3	8	6	29
CHOLESTEROL VALUES IN MG. PER 100 C.C OF WHOLE BLOOD								
Below 140		1						
140 to 179	3	3	0	0	0	1	2	7
180 to 200	0	0	0	1	1	0	0	4
Above 200	0	2	1	0	2	7	4	18

TABLE VII. CHOLESTEROL CONTENT OF WHOLE BLOOD IN PREGNANT SYPHILITIC WOMEN (THIRTY-SEVEN CASES)

SERIAL NO.	AGE	COLOR	DURATION OF GESTATION	BLOOD CHOLESTEROL MG./100 C.C.	WASSERMANN REACTION ANTIGEN	
					ALCOHOLIC	CHOLESTEROL
121	28	b	3	160	+	0
394	37	w	3	165	++++	++++
387	29	b	3	168	++++	++++
391	24	b	3	188	++++	++++
270	38	b	3	211	0	0
187	31	w	4	146	++++	0
117	30	b	4	157	++++	++++
122	28	b	4	174		
393	28	w	4	222	+	++
115	20	w	5	172	+	++
221	31	w	5	175	++++	++++
179	24	b	5	194	0	++
336	23		5	198	++	++
196	31	b	5	200	++++	++++
123	18	b	5	204	0	+
204	30	b	5	211	++++	++++
395	25	b	5	224	++++	++++
111	28	w	5	230	++++	++++
392	43	w	5	248	++++	++++
291	35	b	6	138	0	+++
280	25	w	6	179	++++	++++
345	30	b	6	202	++++	++++
116	28	b	7	125	++++	++++
378	18	b	7	160	0	+
398	35	b	7	170	0	++
382	25	b	7	178	++++	++++
114	27	b	7	194	++++	++++
390	31	b	7	200	++++	++++
385	16	b	7	201	++++	++++
343	20	w	7	202	+	++
113	33	b	7	204	++++	++++
119	18	b	7	218	++++	++++
341	41	w	7	253	++++	++++
396	41	b	7	253	++	++
112	32	b	8	179	0	+++
376	20	w	8	199	0	+
120	28	b	8	241	++++	++++

TABLE VIII. SUMMARY OF CHOLESTEROL FINDINGS IN PREGNANT SYPHILITIC WOMEN (THIRTY-SEVEN CASES)

	DURATION OF GESTATION					
	THREE MONTHS	FOUR MONTHS	FIVE MONTHS	SIX MONTHS	SEVEN MONTHS	EIGHT MONTHS
NUMBER OF CASES	5	4	10	3	12	3
CHOLESTEROL VALUES IN MG. PER 100 C.C. OF WHOLE BLOOD						
Below 140				1	1	
140 to 179	3	3	2	1	3	1
180 to 200	1	0	2	0	1	0
Above 200	1	1	6	1	7	2

As was the case with the data on normal pregnancies, so also, with pregnancies complicated by toxemia and hypertension there is indicated an increase in the cholesterol content of whole blood as pregnancy advances. The percentage of cases giving high cholesterol values (values above 180 mg. per 100 c.c. of whole blood) is practically the same in both series. In the former 66 per cent gave values above 180 mg. whereas in the latter there were 60 per cent.

Tables VII and VIII show the results in 37 cases of pregnant syphilitic women, 29 with a strongly positive Wassermann reaction and 9 with a negative Wassermann reaction. Five patients were in the third month of gestation; 3 had a cholesterol content between 140 and 179 mg. per 100 c.c. of whole blood, 1 between 180 and 200 mg. and 1 above 200 mg. Four cases were in the fourth month of pregnancy. Three of these had a cholesterol content between 140 and 179 mg. and 1 above 200 mg. per 100 c.c. Of the ten cases in the fifth month of pregnancy, 2 showed a cholesterol content between 140 and 180 mg., 2 between 180 and 200 mg. and 6 above 200 mg. per 100 c.c. There were 3 cases in the sixth month of gestation; 1 had a cholesterol content below 140 mg., 1 between 140 and 179 mg. and 1 above 200 mg. per 100 c.c. Seven of the 12 women in the seventh month of pregnancy had a cholesterol content above 200 mg., 1 between 180 and 200 mg., 3 between 140 and 179 mg. and 1 below 140 mg. per 100 c.c. of whole blood. Two cases in the eighth month of gestation showed a cholesterol content above 200 mg. and 1 between 140 and 179 mg. per 100 c.c.

Here again as in the two other series of data for pregnant women, 60 per cent of the cases show a high cholesterol content, i.e., above 180 mg. per 100 c.c. of whole blood. The increase in blood cholesterol content with advance in pregnancy, however, is not as marked as in the previous series although there is a strong tendency in that direction.

CONCLUSIONS

1. The blood cholesterol content in normal nonpregnant women is generally higher than in normal men.

2. The cholesterol content in normal pregnant women is greater than in normal nonpregnant women.

3. As pregnancy progresses, the blood cholesterol content increases. This is indicated by the data on pregnancies complicated with other diseases (toxemia, hypertension and syphilis) as well as by the data on normal pregnancies.

4. The percentage of cases giving high cholesterol values (above 180 mg. per 100 c.c. of whole blood) is practically the same for the three series, 66 per cent of the normal pregnancies, 60 per cent of the pregnancies complicated by toxemia and hypertension and 60 per cent of the pregnancies associated with syphilis.

We appreciate sincerely the interest of the late Professor William E. Studdiford, Professor William E. Caldwell, Dr. Jean Corwin and the entire staff of the Sloane Hospital for Women. Without their very helpful and willing cooperation, this investigation would have been difficult.

It is a pleasure, also, to thank Professors William J. Gies and Edgar G. Miller, Jr. for their kind suggestions.

REFERENCES

(1) *Rosen and Krasnow:* Arch. Dermat. and Syph., 1926, xiii, 506. (2) *Aschoff:* Wiener klin. Wchnschr., 1911, xxiv, 559. (3) *Bacmeister and Havers:* Deutsch. med. Wchnschr., 1914, xl, 385. (4) *Bloor:* Jour. Biol. Chem., 1916, xxv, 577. (5) *Luden:* ibid., 1916, xvii, 273. (6) *Denis:* ibid., 1917, xxix, 93. (7) *Craig and Williams:* Am. Jour. Syph., 1921, v, 392. (8) *Mayo:* Ann. Surg., 1925, lxxxi, 955. (9) *Myers and Wardell:* Jour. Biol. Chem., 1918, xxxvi, 147.

330 Park Avenue.

THE CURE OF CHRONIC GONORRHEA IN THE FEMALE BY MEANS OF A SINGLE SUBCUTANEOUS INJECTION OF LIVE GONOCOCCI

By Alfred Loeser, M.D., Berlin

TO INJECT live virulent gonococci into a human being at first thought would impress one simply as a risky experiment of producing a sepsis. We well know that gonococci may enter the blood stream and then are likely to produce affections of the joints or the heart, even lead to death through sepsis. However, we are equally well acquainted with the fact that the gonococcus proves invasive and virulent solely when in contact with special tissues such as the mucosa of the genital tract in which it can develop its pathogenic qualities. This knowledge deprives such an experiment almost completely of its potential danger. The idea of killing with injection of live bacteria active foci of the same bacteria somewhere in the body is not new. It has been applied in the treatment of infections with the tubercle bacillus, the bacterium coli, also in malaria patients. Inunctions with weakened cultures of spirochetes have been used in the treatment of syphilis.

There is an essential difference between the artificial introduction, e.g., of the anthrax bacillus, either through the intestinal tract or through the skin surface. Only the latter offers conditions favorable for its further

growth. They do not exist in the intestines where the anthrax bacillus therefore will quickly die. A gonococcus will readily get a firm foothold in the urethral mucosa but will succumb in the cutaneous or subcutaneous tissues. It is impossible for the gonococcus to pass from such tissues into blood or lymph channels. No harm is done even if accidentally gonococci are injected directly into the blood stream by unintentional puncturing of a vessel. A few experiences of this sort in healthy individuals showed that the blood immediately destroys these bacteria. There undeniably exists a marked difference between the periodic invasion of gonococci into the blood from a focus in acute or subacute conditions and the one time injection of a small measured quantity of gonococci into a healthy individual with normal temperature suffering from a chronic gonorrhea—probably on account of an immunity gradually acquired from the symptomless chronic gonorrheal focus.

I look upon the chronic gonorrhea of woman as a latent infection, in the main representing a chronic infection of lymph glands. To influence such a condition favorably and promptly, so far has proved impossible by means of known therapeutic measures. Vaccine therapy and particularly all purely local methods of treatment have failed. Only the so-called fresh-vaccine, which some time ago was proposed by me, yields better and readier results. But even with this vaccine weeks and months are required for the cure of chronic cases and in that space of time, of course, a chronic process might also heal spontaneously. We certainly must give preference to a method which immediately after its application, right under our eyes within a few days, effects the cure of a disease which has existed for years, and especially so if no untowards by-effects can be noticed.

This new method is applied in the following manner: From the pus of an acute gonorrhea, male or female, a pure culture is made on ascites-blood agar (half and half). This can be obtained after the first or second transfer. It is important for the therapeutic efficacy that the gonococci are isolated quickly and pass back into the human body after but 24 to 48 hours on the artificial medium. The longer they live on the culture medium, the more they lose their therapeutic efficiency. The germs, grown in this manner on ascites-blood agar in a long serpentine line, are washed off in 3 ccm. of sterile physiologic salt solution. No harm is done if some of the agar is scraped off in the procedure. This suspension is taken up in a syringe and from one-half to one ccm. of it injected subcutaneously in the upper arm. With but one puncture two or three separated wheals can be produced. One culture tube as a rule will suffice for three patients. There are approximately 10 thousand millions of gonococci in one slanting agar tube so that between two and four milliards are contained in one hypodermic injection. Experience shows that the exact quantity is of minor importance as long as the

number of injected germs does not sink below one or rise above eight thousand millions.

Within 24 hours a flaming red erythema develops at the point of injection surrounded by a doughy infiltration. The arm becomes painful but without any swelling of regionary lymph glands. A lymphadenitis or lymphangitis never develops. The erythema is associated with slight rise in temperature, only rarely reaching 38° C. Patient complains of headache, which can be prevented by preliminary administration of some salicylic acid preparation. At the latest within 24 hours after the injection the erythema begins to fade, all clinical symptoms have in the meantime disappeared and the patient is able to resume the customary work since the arm again can be freely used. The infiltration is resorbed gradually and may still be felt even after weeks. If agar was injected with the suspension often (otherwise but rarely), a small afebrile abscess is observed to develop from which gonococci can be obtained in pure culture. Similar injections can be made as well in the skin of the back. The treatment does not require detention of patient at home or hospital.

Which of the chronic gonorrheal cases can be treated in this manner?

1. An injection of live gonococci should be made only if patient for the past six or eight weeks (two menstrual terms) has not been treated in any manner, also not locally, because any type of treatment might change a chronic condition into an acute one, when the injection of live gonococci certainly would prove useless.

2. For this same reason the time of menstruation is unsuitable for an injection because at this time a chronic inflammatory process occasionally is seen to flare up acutely.

3. Women with active mucosal gonorrhea—e.g., in Bartholin gland or rectum, must not be treated in this manner.

4. Excluded are furthermore patients who recently have passed through another acute infectious disease (influenza, diphtheria, etc.).

In other words, only the truly chronic cases are suitable for this treatment.

When is patient cured?

It seems superfluous to follow the injection by often repeated examinations of cervical smears. Within the first few days after the injection gonococci will always be found in the cervical canal. In this location, like on any other open mucosal surface, gonococci obviously cannot be directly affected by the subcutaneous injection. They will continue their parasitic existence there until finally killed by the physiologic defense action of normal tissues. After the hypodermic injection first of all the germs within glands and body tissues will succumb to developing toxins. No new generations of gonococci will be formed. A few days later the diplococci usually cannot any longer be discovered in the cervix. But

if they still are found there they can now be easily destroyed by a single application of one of the customarily employed antiseptics. I hardly ever found it necessary to do this. With but one injection one might see a complete cure effected in a case, observed and treated unsuccessfully often for years. In case of failure a second and even a third injection still may bring the desired cure but I rather incline to the belief that not too much can be expected if the first injection did not yield the expected prompt result. If in three successive menstrual intervals cervical smears are negative and if after local or general provocative measures gonococci fail to reappear, then it seems justifiable to ascribe their prompt disappearance to the injection. Cure, i.e., complete disappearance of all gonococci, usually is achieved within eight to fourteen days after the injection. If they are still found in the third week, the patient in my experience has almost invariably proved absolutely refractory to any form of treatment.

Which chronic gonorrhea patients are found refractory to toxins produced by the injection of live bacteria?

It was striking that most of the failures were encountered in patients of a definite constitutional type. They all showed a tendency towards exudate formation and lymphatic swellings, had previously often suffered from colds and gland disturbances, are inclined towards adiposity, and seem to be characteristic representatives of the so-called lymphatic-exudative type.

How can the prompt therapeutic effect be explained?

The injected live gonococci, more or less promptly, perish within these most unsuitable surroundings. They do not find a chance to establish themselves or to multiply. The question remains open whether the surprisingly prompt recovery of the patient should be ascribed to the quantity or specificity of toxins produced by the death of the injected germs or must be explained on the basis of a greatly stimulated general defense mechanism of the entire body to account for this beneficial curative effect in regions of the body far distant from the site of injection. Possibly both these factors play a rôle. The failures in individuals of a peculiar constitutional type then might be due to their limited ability to react as compared with this same ability in representatives of a better constitution.

I reported my results with this treatment in 1922 at the Leipzig Meeting of German Naturalists and in 1926 before the Urological Society in Berlin. In the meantime more patients have been treated. Together with my associates we have made more than 300 injections without observing harm in a single instance. Personally I have treated 118 women suffering from chronic gonorrheal processes with the injection of live gonococci. Of these, 68 were cured with a single injection and 5 others with two and three injections respectively.

Considering only the 68 women cured with one injection we can state:

They all had been unsuccessfully treated in various ways, either with vaccines or locally. They all had proved to be affected by a rather stubborn infection. The shortest interval since acquisition of the infection in any of them was five months, the longest three and a half years. Three months should have passed since infection before an attempt should be made with injection of live gonococci. Only so it will be certain that the case is truly chronic, that the chances for spontaneous cure are rather limited. As already stated, in acute and subacute cases, in my belief, this new treatment will fail to yield noteworthy results.

After this experience, gained in six years, I conclude that (1) patients suffering from chronic gonorrhea sustain this treatment without the slightest ill effect; (2) a single injection of live gonococci might effect prompt cure of a chronic gonorrhea; (3) of 118 gonorrheal patients, unsuccessfully treated beforehand in various ways, 68 (approximately 60 per cent) recovered after a single injection.

These results justify more extensive employment and test also in cases, clearly chronic, even if not previously subjected to any other type of therapy. I feel certain that in this manner the chronic stage is made to disappear quicker and better than with the vaccine therapy and that the percentage of final cures of chronic cases is increased. My material includes only instances of failures with other measures. It is noteworthy that among my failures there are so many patients of the exudative-lymphatic type in whom the gonorrheal infection tends to assume the character of a latent lymph gland infection.

FIBROMYOMATA AND PREGNANCY, A STUDY OF 250 CASES

By Richard N. Pierson, M.D., New York City

(From the Sloane Hospital for Women.)

CRAGIN and Ryder[1] reported the cases of fibromyomata and pregnancy occurring among the first 20,000 patients admitted to the Sloane Hospital for Women. This paper deals with the similar cases among the succeeding 30,836 admissions to the Sloane Hospital to January, 1925. It completes a study of the Sloane series of fibromyomata in over 50,000 consecutive pregnancies.

A statistical study has been made of the many facts found in the clinical records bearing upon the relations of fibromyomata to pregnancy, labor and the puerperium. The following topics have been selected for discussion: (1) the incidence of fibromyomata noted during pregnancy; (2) spontaneous abortion and premature labor; (3) the effect of fibromyomata upon the course of pregnancy and labor; (4) pelvic fibromyomata; treatment and sequelae for mother and baby; (5) cases in which operative interference during pregnancy,

TABLE I. COMPARISON OF INCIDENCE OF CERTAIN OBSTETRIC ABNORMALITIES IN CASES WITH FIBROMYOMATA WITH 8317 UNSELECTED CONSECUTIVE CASES

	ABORTION PREMATURE LABOR	DRY LABOR	UTERINE INERTIA	PROLONGED LABOR	MEDIUM FORCEPS	HIGH FORCEPS
Fibromyomata	24.1% 39 of 191	44.5% 45 of 101	34.6% 35 of 101	16.8% 17 of 101	16.8% 17 of 101	2.9% 3 of 101
Unselected Cases	14%	7.5%	1%	1%	7.5%	0.6%

labor or the puerperium was thought necessary because of the fibromyomata themselves; (6) maternal mortality; (7) fetal mortality.

Observations on the behavior of the fibromyomata of these patients after pregnancy, and in subsequent pregnancies will be reported at another time.

1. THE INCIDENCE OF FIBROMYOMATA DURING PREGNANCY

In this series of 30,836 pregnant women, fibromyomata were noted in 250 or 0.8 per cent. Cragin and Ryder reported 0.45 per cent (89 of 20,000) and Pinard[2] 0.6 per cent (84 of 13,915).

Fifty-nine of the 250 women had fibromyomata so situated and so small that they could not be held to have any clinical significance. Many of these, indeed, were only diagnosticated on inspection of the uterus at laparotomy. These cases will not be mentioned further. The 250 cases are thus reduced to 191, giving an incidence of 0.6 per cent of clinically important fibromyomata.

The tumors were classified on the usual basis of their position as pedunculated, subperitoneal, intramural, intraligamentous, submucous or pelvic. Most of the cases represented combinations of two or more of these varieties so that classification became complicated and conclusions difficult. The pelvic tumors alone seemed to justify their separate grouping from the standpoint of useful clinical deductions. They will be described below.

2. SPONTANEOUS ABORTION AND PREMATURE LABOR

Abortion is defined as the discharge of the fetus before the period of viability. Premature labor is defined as labor occurring between the thirtieth and thirty-eighth week of gestation.

Only two of the 250 cases observed at Sloane aborted spontaneously in the first trimester. In consideration, however, of the uncertainty of all the facts relative to the incidence of abortion in this period, no conclusion seems justified. A striking situation, however, becomes apparent when abortion after the third month and premature labor are studied. In this period, 20 women aborted spontaneously, and 19 additional patients fell into spontaneous premature labor. Thus 39, or 24.1 per cent, of the 191 women either aborted or had premature labor. The fetal mortality of these cases was 78.7 per cent.

TABLE I—CONT'D

	BREECH DELIVERY MAURICEAU	INTERNAL PODALIC VERSION	HEMORRHAGE	FETAL MORTALITY AFTER 3 MOS.	MATERNAL MORTALITY
Fibromyomata	18.8% 19 of 101	8.9% 9 of 101	33.6% 58 of 191	32.1% 62 of 193	3.6% 7 of 191
Unselected Cases	6%	2%	4%	6.6%	0.9%

The tumors themselves were considered to be the actual clinical cause of 16 of these abortions and of 14 of the premature labors. This gives an incidence of abortion and premature labor due to the fibromyomata of 16 per cent (31 out of 191).

Similar findings are reported by other writers. Pinard found 15 per cent (13 of 84), Lobenstine[3] found 15 per cent (100 cases), while Cragin and Ryder reported a 24 per cent (22 of 89) incidence of spontaneous abortion or premature labor in cases of fibromyomata complicating pregnancy.

These facts establish clearly the high incidence of spontaneous abortion and premature labor. Fibromyomata must, therefore, be ranked clinically with the toxemias of pregnancy, syphilis, and abnormal conditions of the cervix, as one of the most important conditions causing abortion and premature labor. The question arises whether or not these accidents can be prevented to any important degree. They can if obstetricians become aware of their danger and if they will safeguard their patients by very frequent antepartum observations to detect the first signs of abnormal irritability of the uterus. In addition they must take extraordinary pains to instruct their patients as to the causes and prevention of abortion and premature labor.

3. THE EFFECT OF FIBROMYOMATA UPON THE COURSE OF PREGNANCY AND LABOR

The tradition is established that fibromyomata are relatively harmless. Thus Cragin said that, "Although the association of fibromyomata and pregnancy is relatively a frequent one, disturbance by them of the normal course of labor is unusual." This attitude is probably founded upon the repeated observation that relatively few fibromyomata cause obstruction to the presenting part. While this is true, there are repeated observations in the literature that show that the incidence of many other important complications of pregnancy, labor, and the puerperium is increased by the presence of these tumors. That such is the fact is shown in Table I.

This markedly increased incidence of serious abnormalities in the cases of fibromyomata forces the conclusion that the traditional lack of respect for them as a clinical danger is unwarranted.

4. TREATMENT AND SEQUELAE OF PELVIC FIBROMYOMATA FOR MOTHER AND BABY

Pelvic fibromyomata are defined for this paper as those which were described in the clinical records as "pelvic" or "in the lower uterine segment."

The incidence of pelvic fibromyomata was 15 per cent (30 of 191). Cragin and Ryder reported 12.3 per cent (11 of 98). Of their cases two were delivered vaginally after pushing the tumor out of the pelvis. The remaining nine had the following operations: hysterectomy 4, myomectomy 2, cesarean section 1, cesarean section and hysterectomy 1, craniotomy 1. Thus 81.8 per cent of their cases required major operative interference.

In the present series of 30 cases, operative interference was necessary in 22, or 73.3 per cent. The following operations were done: cesarean and hysterectomy at term 11, cesarean and myomectomy at term 6, cesarean alone 1, hysterectomy at six months 2, vaginal myomectomy at term 1, abdominal myomectomy at two months 1. Sixteen of the 30 cases of pelvic fibroyomata were given a trial labor. Eight of these cases were delivered through the vagina. The remainder required cesarean section. The maternal mortality was 3.33 per cent; the fetal mortality was 30 per cent.

One of these patients was delivered vaginally after pushing an obstructing tumor out of the pelvis. In her next pregnancy cesarean section was necessary after a twenty-four hour trial labor.

5. OPERATIVE INTERFERENCE DURING PREGNANCY, LABOR, OR THE PUERPERIUM, WHOSE CHIEF INDICATION WAS THE FIBROMYOMATA

Major operative procedures were undertaken because of the fibromyomata in 42, or 21.4 per cent of the 191 cases. The following operations were done: therapeutic abortion 1, hysterectomy before viability 6, vaginal myomectomy 1, abdominal myomectomy 4, induction of labor with bag followed by cesarean and myomectomy 1, cesarean and myomectomy 8, cesarean and hysterectomy 19, postpartum hysterectomy 2.

The maternal mortality was 1.5 per cent; the fetal mortality 7.7 per cent. In addition, the following 48 obstetric operations were done: 9 versions, 20 breech deliveries, 3 high forceps and 16 medium forceps. This gives a total incidence for operative interference of 46.5 per cent.

Lobenstine, reporting 85 cases at or near term, found major operative interference necessary six times before or during labor, and eight times during the puerperium. This gives an incidence of interference of 16.4 per cent. In addition he reported 15 vaginal operative deliveries, so that his total incidence of operative interference was 34.1 per cent.

Pinard reported 35.7 per cent of 84 cases requiring intervention, four times during pregnancy and 24 times during labor.

Lockyer[4] summarized Scipiades' paper based upon 67 cases. Scipiades found that operation became imperative in from 30 to 33 per cent of the cases. Lockyer himself reported 23 cases in which operation was necessary in 19 cases or 82.6 per cent.

It seems possible to conclude from these combined observations, covering a large series of cases, that major operative interference becomes necessary in about 20 per cent of the cases. Vaginal operative interference becomes necessary in roughly another 20 per cent of the

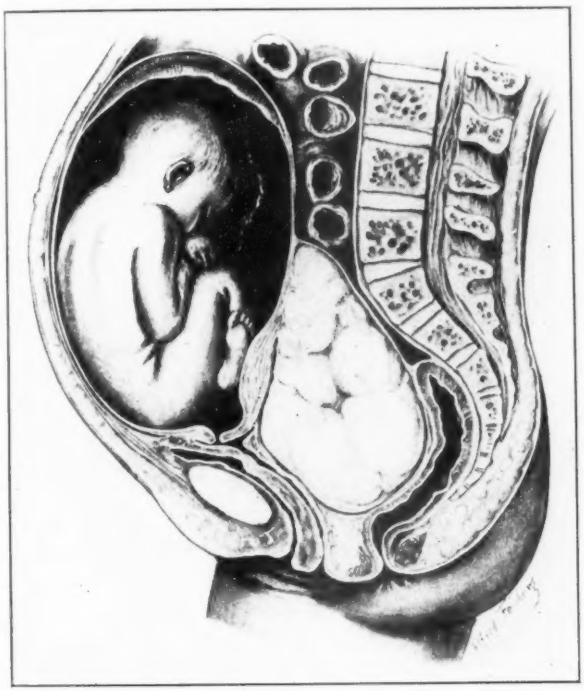

Fig. 1.—Hysterectomy at six months, during labor for incarcerated retroverted uterus with large fibromyoma in fundus.

cases. With these facts established it is impossible to agree with the conclusion so often expressed in the literature that fibromyomata rarely cause trouble or require special treatment.

The following cases are typical of this group:

Case 1.—The patient had been in labor two days. Ineffectual efforts were made with forceps to extract what was believed to be the baby's head. A consultant recognized the nature of the difficulty and brought the patient 60 miles to New York. At operation a very large fibromyoma was found occupying the entire fundus of the uterus which was incarcerated in the pelvis. There was anterior sacculation of the uterus to accommodate the six and one-half months' fetus. Hysterotomy and hysterectomy were done. The patient made a good recovery save for a phlebitis. (Fig. 1.)

CASE 2.—A twenty-four year old primigravida showed at term a large fibromyoma attached to the left anterior lower uterine segment. No symptoms from the tumor were described. Elective cesarean section and hysterectomy were done. The patient had a temperature of 105° for three days and thereafter convalesced normally. This case illustrates the anterior attachment of a pelvic tumor. The relatively narrow pedicle, the normal condition of the rest of the uterus, and the youth of the patient, suggest that myomectomy might have been attempted. (Fig. 2.)

CASE 3.—The patient complained at five months of pain in lower abdomen, legs and back. The pain was intermittent, knife like, disabling, preventing sleep. Hysterectomy was done because the pain was not sufficiently relieved by rest in bed. Convalescence was uncomplicated. This case illustrates the type in which very large tumors require hysterectomy before viability because of severe pain unrelieved by rest in bed.

Fig. 2.—Hysterectomy for large obstructing fibromyoma attached anteriorly to lower uterine segment.

CASE 4.—The patient complained at four and one-half months of severe left upper abdominal pain with distention and vomiting. A large, tender fibromyoma was found attached to the left horn of the uterus. She was kept in bed in the hospital for the remaining twelve weeks of her pregnancy. Pain and distention recurred frequently but were relieved by sedatives, poultices and colon irrigations. The hemoglobin dropped from 75 per cent to 44 per cent without external bleeding. Cesarean section followed by hysterectomy and appendectomy were done at term. The tumors were subperitoneal, intramural and intraligamentous. That in the left broad ligament measured 12 by 9 by 8, showed necrosis and peritoneal inflammatory reaction. The appendix was firmly adherent to the anterior aspect of the uterus. Convalescence was uncomplicated for mother and child. This case shows that patients with marked symptoms can sometimes be carried to term with a good result for mother and baby if they are kept in bed and treated symptomatically.

CASE 5.—A thirty-four year old primigravida, at three and one-half months, showed a large fibromyoma extending two inches above the umbilicus. There were no subjective symptoms. Her hemoglobin, however, was 37 per cent, RBC 3,500,000. The anemia may have been caused by badly infected teeth. These were extracted. With rest in bed, Blaud's Pills, and a transfusion, the red blood cells rose to 4,400,000 and hemoglobin to 52 per cent. Despite this improvement and the patient's desire for a baby, even at great inconvenience, hysterectomy was done. The belief was that the very large tumor would cause abortion anyway. Convalescence was uncomplicated.

This case is one in which difference of opinion may exist as to treatment. Many would agree that this woman should have been given her chance to carry to viability or term. (Fig. 3.)

CASE 6.—A forty-two year old primigravida at term showed multiple, large fibromyomata without symptoms. Elective cesarean and hysterectomy were done. A large, spongelike, degenerated fibromyoma was found attached by a pedicle to the

Fig. 3.—Hysterectomy at three and one half months, no compelling symptoms. Indication, large size of tumor.

left horn of the uterus. Convalescence was uncomplicated. This case shows that complete degeneration of a pedicled fibromyoma may occur without causing urgent symptoms. (Fig. 4.)

CASE 7.—A thirty-one year old primigravida was found to have a small fibromyoma when first examined for sterility. Pregnancy followed. Threatened abortion with slight bleeding occurred at the third month and threatened premature labor, with bleeding, at the seventh and throughout the eighth month. At term there was marked albuminuria and anemia: Hgb. 35 per cent, RBC 2,360,000. Two transfusions were given. Labor was spontaneous and normal. The baby weighed seven pounds. There was marked abdominal pain and unusually severe after pains postpartum. On the fifth day, the lochia became foul and the uterine cramps worse. A large necrotic fibromyoma 12 cm. in diameter was removed from the vagina on the seventh day. Convalescence was normal thereafter. This case illustrates the sloughing and expulsion of a submucous fibromyoma in the puerperium.

CASE 8.—A thirty-six year old primigravida aborted spontaneously at five months. The placenta could not be expressed and attempts to remove it manually or with instruments failed because of a large fibroid in the lower uterine segment which prevented access to the uterine cavity. The cervix and vagina were packed with gauze. Twelve hours later the placenta was still retained so that hysterectomy was done. Examination of the uterus showed the placenta not adherent but held in the uterine cavity by a tumor blocking its exit. There was postoperative shock and a febrile course for twelve days, followed by recovery. Judgment of this case is difficult. It is hard to believe, since a five months' fetus had passed that the placenta could not have been removed. Yet two experienced operators were unsuccessful.

CASE 9.—A twenty-nine year old primigravida started to abort spontaneously at six months. A large fibromyoma was recognized in the lower uterine segment anteriorly. Uterine contractions were irregular and ineffectual. There was persistent, moderate bleeding from the uterus. A marginal placenta previa was

Fig. 4.—Complete degeneration of pedicled fibromyoma without marked symptoms. Hysterectomy at term.

recognized. A bag was placed in the cervix. When it came through, cord prolapsed, a version and extraction of a 30 cm. dead fetus was done. The uterus and vagina were packed with iodoform gauze. The patient ran a moderate febrile course with a fast pulse, moderate abdominal distention and tenderness over the uterus. These symptoms were interpreted as indicative of infection in the tumor. Hysterectomy and bilateral salpingo-oophorectomy were done on the seventh day. There was a small abscess involving the right tube and ovary, to which the appendix was adherent. There were signs of a pelvic peritonitis. The patient recovered from severe shock after twelve hours and made an uneventful recovery. The pathologist reported an acute inflammation of premature placenta, endometritis, right salpingitis, and peritonitis. Section of the tumor showed varying degrees of degeneration but no inflammation.

The question brought up by this case is whether or not the presence of fibromyomata in infected puerperal uteri justifies hysterectomy. The treatment of puerperal uterine infection in general by hysterectomy has no standing. The pathology reported in this case suggests little reason for so radical a departure from the

accepted teaching. Yet the patient after a critical twelve hours recovered splendidly, more quickly than would have been expected with conservative treatment.

Consideration of these cases suggests the question whether or not interference was always justified. Many would agree that the five myomectomies during pregnancy were ill advised. Even if allowed to go to term, however, it is probable that four of those cases would have required major operative interference. The necessity of two of the hysterectomies before viability, in cases without compelling symptoms of pain, bleeding or pressure, could be questioned, for opinion is strong in the literature that conservatism should be practiced. No operation is justified by the fear of symptoms or complications which may arise but only by urgent ones that actually have appeared.

6. MATERNAL MORTALITY

Eight of the 250 women (3.2 per cent) died. Necropsy showed that one of these women died of an acute bronchopneumonia following a normal labor and delivery. There is, therefore, a mortality due to obstetric causes of seven of 250 (2.08 per cent). Cragin and Ryder reported a gross maternal mortality of 3.3 per cent (89 cases); Pinard 3.6 per cent, Lobenstine 4 per cent (100).

The clinical histories of the fatal cases follow:

CASE 1.—The patient showed at term, before labor, an obstructing fibroid. A large necrotic fibroid was removed *per vaginam*, the colpotomy wound being packed with iodoform gauze. Membranes ruptured spontaneously three days later. A nine hour labor with frank breech delivery of a stillborn fetus followed. The patient died of pelvic and general peritonitis.

At the present day vaginal myomectomy would not be done and spontaneous trial labor would be permitted to determine whether or not the pelvic tumor would withdraw or could be pushed out of the pelvis. Failing to dispose of the obstructing tumor, abdominal cesarean section would be done followed by myomectomy or hysterectomy.

CASE 2.—A thirty-six year old primigravida fell into spontaneous labor at term. She had a forty-six-hour labor, twenty-six hours with ruptured membranes. A bag was placed in the cervix to combat inertia and favor dilatation. Finally, cesarean section without myomectomy or hysterectomy was done. The indication given was "large child, flat pelvis, R. O. P., head high, no advance." The operator described the uterus as "studded with very many larger and smaller fibroid nodules, the largest, size of walnut—but uterus contracted well and there was little bleeding." The nine pound baby lived. The mother died of uterine sepsis and general peritonitis. The excessively prolonged labor and the use of the bag were not justified. An examination under anesthesia early in labor might have permitted the recognition of the fibromyomata and made more clear the other indications for cesarean. Most important of all, it is clear that a hysterectomy should have been done in view of the prolonged labor with vaginal interference, the pathology of the uterus, and the patient's age.

Case 2 represents a very important, though relatively uncommon, type; namely, that in which there are very numerous small fibromyomata throughout the uterus whose presence is not usually recognized until cesarean section is done. The following case history is a similar one which shows, in the good result for mother and

baby, the wisdom of a more radical point of view in the treatment of such cases. A thirty-seven year old multipara had had one full term successful delivery by high forceps. In the present pregnancy she had moderate abdominal pain and bleeding from the uterus in the last month. At term, fibromyomata were not recognized, but the uterus was hard, the position a breech and difficult to make out. Because of these facts, the patient's age and obstetric history and the feeling that the uterus was abnormal, cesarean section and hysterectomy were done. The uterus was found to be studded throughout with small fibromyomata.

CASE 3 was practically the same as Case 2. Cesarean section without hysterectomy was done after a prolonged labor with marked dystocia and vaginal interference. The patient died of uterine sepsis and peritonitis.

CASE 4.—A thirty-nine year old patient was delivered by low forceps after a fifteen hour labor. Large intramural fibromyomata were noted. An adherent placenta was removed manually. No undue hemorrhage was noted during or soon after delivery. The uterus was packed several hours later, however, for persistent bleeding. The patient succumbed to hemorrhage and shock in six hours. This case shows the necessity of the most careful conduct of the third stage of labor and early postpartum period. In some cases prophylactic tamponade of the uterus and vagina is indicated.

CASE 5.—A twenty-eight year old negress, gravida 2, showed a pedicled fibromyoma (16 by 15 by 10 cm.) attached to the six months' pregnant uterus just below the round ligament. The pedicle was 4 cm. long and 2 cm. wide. The tumor had given no symptoms, but had grown rapidly in one month's time, according to the patient, from the size of an egg at the level of the navel to extend almost to the ensiform. At laparotomy, omentum was found adherent to the fibromyoma. There was profuse bleeding from the uterine wound, but this was controlled by suture. Signs of increasing intestinal obstruction followed operation, and there was disruption of the abdominal wound on the fifth day after operation. The intestines were replaced in the peritoneal cavity and the wound closed, but the patient died the next day. This case with its large, rapidly growing fibromyoma attached to the uterus by a narrow pedicle is one in which myomectomy is to be considered. Yet this patient presented no imperative indication (bleeding, pain or pressure) for operation. Myomectomy was done because of the fear of what the tumor might do, not because it was actually causing important symptoms. The literature shows the concensus of opinion to be that myomectomy is ill advised during pregnancy, giving bad results for mother and baby. Lockyer quotes Troell who reported 157 conservative myomectomies (100 for various symptoms, in 57 no symptoms stated) during pregnancy. The fetal mortality was 23.9 per cent and maternal mortality was 3.9 per cent. The average fetal mortality in women with myomata is given by Troell as about 20 per cent and his comment is that by putting the mother to the danger of this operation we gain nothing in the interest of the child. In the present series, five myomectomies were done during pregnancy with the death of two mothers and all but one of the fetuses.

CASE 6.—A twenty-one year old primigravida had had a myomectomy for fibromyomata two years before the present pregnancy. Cesarean section was done at term after a few first stage uterine contractions. The operator gave his indication as follows: "Previous operation had split uterus in anterior wall to remove fibroid polyp from interior. After consultation it was decided that cesarean was indicated because of danger of rupture of previous scars." The surgeon found at operation "a dense sheet of adhesions covering entire anterior wall of uterus and both tubes and ovaries." There was considerable bleeding after removal of placenta and membranes. The uterus was packed with iodoform gauze and pituitrin given. It contracted fairly well. Hysterectomy was not done because of anticipated difficulty

from the extensive adhesions. The patient took her anesthetic badly throughout. The adhesions were left alone. The uterus was restored to the abdominal cavity with great difficulty. A single small fibromyoma was enucleated from the uterine wound. The eight pound baby survived. The mother died of shock and hemorrhage five hours later.

The one small surviving fibromyoma in the uterus had nothing to do with the clinical disaster. It serves, however, to bring up for discussion the treatment of these most troublesome cases; namely, those in which the uterus has been subjected to multiple incisions for fibromyomata and in which, consequently, there is feared during subsequent labor the dangers to mother and child of uterine inertia on the one hand and rupture of the uterus on the other. There are no cases on record at the Sloane of the latter complication. Moreover, the researches of Williams[5] and Gamble,[6] on uterine wound healing after cesarean section, and those of Wilson[7] on the incidence of rupture of the uterus in labor subsequent to cesarean section, suggest that the danger of rupture of the uterus during labor is not great after myomectomy.

The Sloane cases of pregnancy after myomectomy are not available for this report. It is our impression, however, that the incidence of dystocia from uterine inertia is considerable. The danger in such instances is of course greater for the child than for the mother. The clinical history just detailed shows the danger to the mother of cesarean section. There is probably an increased morbidity and mortality in such cases due to the extensive peritoneal adhesions which are often present and prevent contraction of the uterus and allow hemorrhage.

No precise conclusions are possible from these observations. It is our opinion, however, that a conservative policy should be followed in such cases and that cesarean section should not be done unless there are indications in addition to that of the former myomectomy.

The other two maternal deaths were attributed in one case to acute bronchopneumonia, and in the other to hemorrhage from a cervix badly lacerated from a precipitate delivery.

7. FETAL MORTALITY

The gross fetal mortality in 191 pregnancies with fibromyomata was 35.6 per cent (64 of 193). Cragin and Ryder reported 34.8 per cent, Pinard 32.6 per cent and Lobenstine 21 per cent. Yet textbooks do not emphasize fetal prognosis or mortality in their discussion of fibromyomata and pregnancy. As stated before, they give the impression repeatedly that fibromyomata are relatively harmless. How differently an internist or surgeon would react to the conduct of a clinical problem in which there was a mortality of 35 per cent!

Study of the records showed that the fibromyomata were probably clinically responsible for 40 (60.20 per cent) of the 64 fetal deaths. This gives a corrected fetal mortality due to the fibromyomata themselves of 20.7 per cent. The chief cause of this fetal mortality was prematurity (37 of the 40 babies lost, because of the disturbing fibromyomata, were premature).

No further facts are necessary to indicate the wisdom of giving to the parents a guarded prognosis for the baby in all cases of pregnancy and fibromyomata. The obstetrician, on his part, must exert every effort to carry these patients to term thereby reducing to an important degree the fetal mortality from prematurity.

SUMMARY AND CONCLUSIONS

1. The incidence of clinically important fibromyomata, 191 in 30,836 consecutive pregnancies, was 0.6 per cent, of which 15 per cent were in the pelvis.

2. Spontaneous abortion or premature labor occurred in 24.1 per cent of the cases.

3. The incidence of important obstetric abnormalities and complications is markedly increased by fibromyomata.

4. Major operative interference was necessary because of the fibromyomata in 21.4 per cent of the 191 cases (42 of 191). It was necessary in 73 per cent of the 30 pelvic cases.

5. The gross maternal mortality was 3.2 per cent (8 of 250). The mortality due to obstetric causes was 2.08 per cent.

6. The gross fetal mortality was 35.6 per cent (64 of 193). The mortality for cases in which the fibromyomata were probably responsible was 20.7 per cent. Prematurity was the chief cause of fetal death.

7. The literature does not sufficiently emphasize the danger of fibromyomata to mother and baby, particularly to the latter.

8. During pregnancy special effort should be made to prevent abortion and premature labor. Interference is indicated only by the appearance of severe symptoms of pain, bleeding, or pressure, which do not yield to treatment. At term a test of labor is often desirable.

During labor if obstruction from the tumor persists, or other varieties of dystocia are marked, cesarean section should be done with myomectomy or hysterectomy, according to the indications. The third stage of labor requires particular attention to prevent hemorrhage from a poorly contracting uterus.

In the puerperium, fibromyomata may undergo degeneration and necrosis. They may slough into the uterine cavity and become infected. Where signs and symptoms point to the tumor itself as being primarily affected radical surgery is indicated. Where, however, the tumors are simply included in a general morbid process (such as an acute uterine infection), radical interference is not so clearly indicated.

REFERENCES

(1) *Cragin and Ryder:* Obstetrics, New York, 1916, Lea & Febiger. (2) *Pinard, A.:* Fibromes et Grossesse, Ann d. gynec. et obstet., 1901, iv, 165. (3) *Lobenstine, R. W.:* Fibromyomata of the Uterus, Complicating Pregnancy, Labor and the Puerperium, Transactions of the American Association of Obstetricians and Gynecologists, xxiii, 1910, 371-398. (4) *Lockyer, Cuthbert:* Fibroids and Allied Tumors, London, 1918, Macmillan and Co. (5) *Williams, J. Whitridge:* Bulletin Johns Hopkins Hospital, 1917, xxviii, 335. (6) *Gamble, Thomas O.:* Bull. Johns Hopkins Hosp., 1922, xxxiii, 93. (7) *Wilson, Karl M.:* A Clinical Study of 133 Pregnancies Following Cesarean Section, Am. Jour. Obst. and Gynec., 1926, xii, 268.

(For discussion, see page 391.)

PERIODICITY OF SEX DESIRE

PART II. MARRIED WOMEN

By Katharine Bement Davis, Ph.D., New York, N. Y.

AT THE end of our paper on "Periodicity of Sex Desire"[1] based on the replies of 1000 unmarried college graduates to a questionnaire on the sex life of normal women, we referred to the fact that our material on the same topic gathered from the questionnaire to married women was not as full nor in some ways as satisfactory as that received from the unmarried. This is due in part at least to the form and arrangement of the questionnaire itself. That for unmarried women is divided into sections on a basis of subject matter, while that for married women is on a basis of age and status.

In both, Section I deals with General Information designed to give us not only certain definite details of age, education, occupation, etc., but to orient us as to the type of woman replying.

In the unmarried women's questionnaire, Section II deals with Sex Information and Sex Instruction; Section III with Sex Feeling and Sex Experience; Section IV with Sex Problems; and Section V with Opinions.

In the married women's questionnaire, Section II deals with childhood to fourteen years; Section III, fourteen years to marriage; Section IV, marriage; and Section V with women who have passed the menopause.

In the unmarried women's questionnaire the questions concerning sex desire and its relation to the menstrual period naturally come under Section III, Sex Feeling, while in the married women's questionnaire they were placed under the section dealing with experiences from fourteen years *up to marriage*. Unfortunately no questions relating to this particular point were placed in the section dealing with marriage and only in a few instances did the women in their replies state in what way if any their feelings were changed by marriage.

It seems quite possible that marital experiences may have blunted the memories of what went before and that this may account at least partially for the much smaller number who report that they recognized periodicity of desire.

The questions concerning periodicity of sex desire and its relation to the menstrual period, as they appeared in the questionnaire for married women are as follows:

Section III. *Fourteen years to marriage*

1. Did you experience any strong sex feelings or desires during girlhood? (From age fourteen to marriage: e.g., excitation of organs; craving for self-induced sex pleasure; sex intercourse with a man.) If so, describe their nature.

[1] Am. Jour. Obst. and Gynec., December, 1926, Vol. xii, No. 6, p. 824.

2. Did these desires (if any) arise at more or less regular periods? If so:
   (a) How many such marked periods of desire did you have in the time between menstruations (monthly sickness)?
   (b) What relation, in time, did they have to your menstrual period (during; before; after; how long before or after)?
   (c) If you had more than one such wave of desire between menstruations, were they of equal or different intensity and duration? How far apart were they? How long did they continue?
   (d) Were these periods of desire (if any) strong enough to produce temptation to sex indulgence?
   To diminish resistance to temptation?

Table I answers the first question.

TABLE I. SEX FEELING DURING GIRLHOOD

SECTION III. 1.		
Entire question unanswered	43	
"Do not remember"	6	49
Deny any sex feeling or desire during girlhood		582
Admit sex feeling or desire before marriage		369
	Total	1000
NATURE OF FEELING		
Unanswered		19
Spontaneous excitation of organs		193
Craving for self-indulged sex pleasure		128
[1]Craving for sex-intercourse with a man		61
All three		9
Desire for brutal handling		2
Desire for love-making		3
		396[2]
[1]Only after engagement		21

[2]Of these 46 mention two of the three desires.

It will be noted that 369 recall such feelings. The answers of this group to question 2 are shown in Table II.

TABLE II

Have observed sex feeling during girlhood		369
Have observed regular periodicity	126	
Have observed irregular periodicity	45	
Have observed no periodicity	176	
Unanswered	22	
	369	

It will be noted that only 126 of the 369 observed regular periodicity, while 45 others observed a periodicity which did not occur every month.

In answer to question 2(a), we have the results shown in Table III.

TABLE III. NUMBER OF PERIODS OF DESIRE BETWEEN MENSTRUAL PERIODS

SECTION III 2. (a)		
1 period		69
2 periods		22
One or two	10	
"One or more"	1	
One to three	1	
One to four	1	
Two or three	4	
Three	3	
Three or four	3	
Five	1	
"Several"	6	
Daily	5	35
		126

Omitting for the moment the consideration of the relation of periodicity to the menstrual period, we observe that question 2 (c) of Section III was quite generally ignored or misunderstood. So few of the 126 who observed periodicity attempted any reply that no comments are worth while. The answers to 2 (d) are shown as follows:

Was desire strong enough to produce temptation to sex indulgence?

Yes	66
No	40
Unanswered	20
	126

To diminish resistance to temptation?

Yes	43
No	19
Unanswered	64
	126

Following the order of presentation adopted in Part I of this paper, we will consider next the relation of periodicity of desire to the menstrual period and the relative frequency with which "before," "during," "after" or "midway" is mentioned. Table IV presents this relation in the 126 cases which recognize definite periodicity.

It will be observed from the totals that the difference in percentages between those who say "before" and those who say "after" is negligible. This is not the case with the unmarried group where it is shown in Part I that the ratio is as 4 to 3.

In addition to the 126 women who observed regular periodicity, 45 others had noted a periodicity which occurred at "less regular intervals," that is, not every month.

The relation of these desires to the menstrual period is shown in Table V.

The numbers in this group are too small for mathematic treatment. It is interesting, however, to note that while there is little difference in the proportions of those who say "before" and "after," as is the case with the group shown in Table IV, the percentage of those who mention "during" is very considerably higher. What, if anything, is the significance of this it is impossible to say.

From the group of 126 observing relative periodicity, we have selected 76 cases which place the date of the periods of desire so definitely that it is possible to chart them. The method is that used in Part I, Unmarried Women.

The circle, Chart I, divided into 28 segments, represents the lunar month. Four days are taken for the menstrual period, and the week preceding and the week following are indicated. We have arbitrarily assumed the menstrual cycle to be twenty-eight days and the average

TABLE IV. [1]PERIODICITY OF DESIRE WITH REFERENCE TO THE MENSTRUAL PERIOD

NUMBER OF PERIODS	BEFORE	DURING	AFTER	MIDWAY	COMMENTS
One					
69	30	1	20	3	
		6 and	6		
	5	or	5		
	1 and	1			
	1 or	1			
	2 and	2 and	2		
Two					
	19	and	19		
22			2 and	2	About 2 weeks after first period.
	1 and	1 or	1	1	
Three					
3	1 (1)	and	1 and	1	(1) Midway period strongest
	1 and		1 and	1	
	1 (2) and	1 and	1		(2) Hard to tell whether she means (1) continuous or (3) separate periods.
One or two					
10	2 (1)				(1) Second period only occasionally.
	1 (1)	1 and	1		
			1 (2)		(2) Both after—first always and most intense; second occasionally and within same week.
	1		1 (3)		(3) Always after—sometimes before also. No explanation as to which is more usual.
	1 (4)				
	1 (4)	1			(4) Always before—during occasionally.
	1 (5)		1		(5) Always before—after occasionally.
	1 (6)	or	1	1	(6) May come at any of these times but never during.
One person replied: "One or two always," but does not place with reference to menstrual period.					
Two or three					
	1 (1)		1		(1) Two or three occur within the week before or the week after.
4			1 (2)		(2) Within one to two weeks after.
	1 (3)		1		(3) Right after and within week before.
	1 (4)		1	1	(4) At about one to two weeks' intervals.

TABLE IV—CONT'D

NUMBER OF PERIODS	BEFORE	DURING	AFTER	MIDWAY	COMMENTS
Three or four					
3		1 (1)	1		(1) Toward the last of the period and in the week following.
	1 (2)		1		(2) Desire most intense just before.
	1 (3)		1		(3) Very seldom before—after about a week apart if satisfied do not come closer together.
"One or more"					
1	1 (1)				(1) Most intense just before.
One to three					
1	1		1		
One to four					
1	1 (1)	1	1	1	(1) Just before always. The others may come about a week apart.
Five					
1	1 (1)		1	1	(1) During the period of from 10 to 18 days after.
Several					
6	2				
	1 (1)		1		(1) Only occasionally and faint.
	1 (2)		1	1	(2) May come in intervening weeks.
	1	1 (3)	1		(3) Toward very end of period sometimes.
	1	1 (4)	1		(4) Most intense after; sometimes only at end of period.
Daily					
5	1 (1)		1		(1) Strongest just before and just after.
			2 (2)		(2) Strongest just after.
	1 (3)	1	1		(3) Strongest just before, during and after.
	1 (4)		1	1	(4) With the exception of during and a day or two after.
Total					
126	88	20	83	14	205
	42.9%	9.7%	40.4%	6.7%	

*Where a figure appears in two columns connected by the word "and", as for example, "6 and 6" in the two columns headed "during" and "after," it means that six individuals state that they have a period of desire beginning during menstruation and extending a day or more into the time following. "Or" connecting two figures means that the desire may come at one time or the other.

TABLE V. RELATION OF DESIRE TO MENSTRUAL PERIOD OF THOSE WHO DO NOT RECOGNIZE MONTHLY PERIODICITY

BEFORE	DURING	AFTER	MIDWAY	COMMENTS
11 (1) (2)	5(3) (4)	9		(1) Two comment on dreams.
				(2) One person tries to lessen feeling by working late.
1 or	1			(3) One "feels very languid and eager for spooning at this time."
1 and	1			
4 (5)	or	4		(4) One comments on day-dreams.
5	and	5		(5) One says: "am easily thrilled by men."
	5 and	5		
	1	and	1	
3 and	3 and	3		
25	16	26	1	Total 68
36.7%	23.5%	38.2%	1.5%	

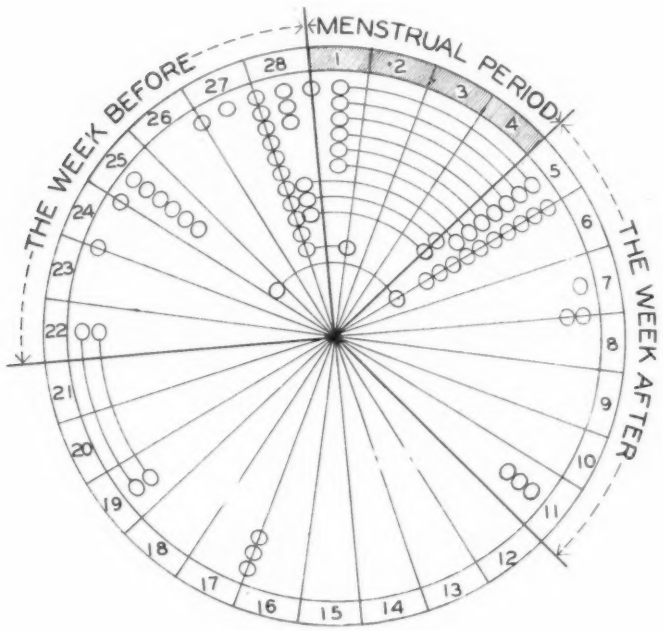

Chart I. Frequency of sex desire. Fifty-six cases with one period of desire monthly.

menstrual period to be four days. Work under way by a number of investigators may show that neither assumption is exact. For the presentation of our data it serves well enough.

Chart I presents 56 cases of one period of desire monthly. The 56 circles represent the dates in relation to the menstrual period. If a statement reads, "one or two days before," the circle is placed on the line between the dates. When a statement reads, "six days before," the circle is placed in the sixth segment preceding the one marked one. Where a statement reads, "beginning in the menstrual

period and continuing into the day following," two circles connected by a line indicate this condition.

It will be noted that as in the case of the unmarried women, the very large proportion of dates given fall within a period included in the week before the menstrual period, the period itself and the two days following it.

Chart II presents twenty cases where two definite periods are named. The black circles are numbered; for example, there will be two black circles bearing the figure 1. These are the two dates given by the first member of this group.

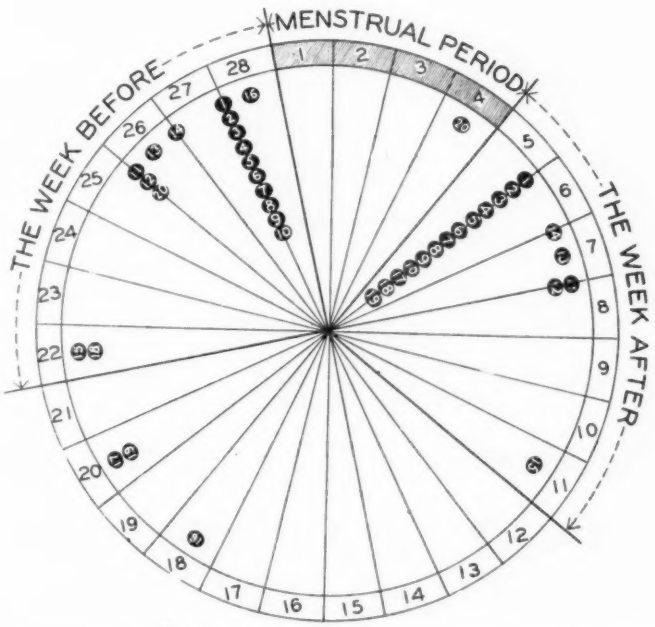

Chart II. Frequency of sex desire. Twenty cases with two periods of desire monthly.

As in Chart I, the bulk of the circles occur within a limit of eighteen days, only 3 cases being dated outside this limit. Chart III shows the combined groups.

Only 7 circles, or 7.3 per cent of the entire number, fall outside the eighteen days referred to above.

Chart IV is a combination of Charts III in Parts I and II of this study.

It represents the data presented on the two charts from the 110 unmarried and the 76 married women, with the addition of 14 cases not included in the remainder of the study, thus bringing the total cases considered up to two hundred. Of the 14 cases added, 4 were married and 10 unmarried women. The white circles represent the

126 cases with one period of desire and the black circles the 74 cases with two periods. Thus there are 274 circles on the chart. Only 8 of the 126 white circles fall within the period from the seventh day after menstruation to the seventh day before. Twenty-one of the black circles representing one of the two periods of desire in the 74 cases fall within the same limits. In no case do two periods of desire for the same individual fall within this limit. About 60 per cent of the circles are found within the period of two days before to two days after menstruation; 274 circles, or 5 per cent, are in the week preceding, and 86, or 31 per cent, are in the week following the period.

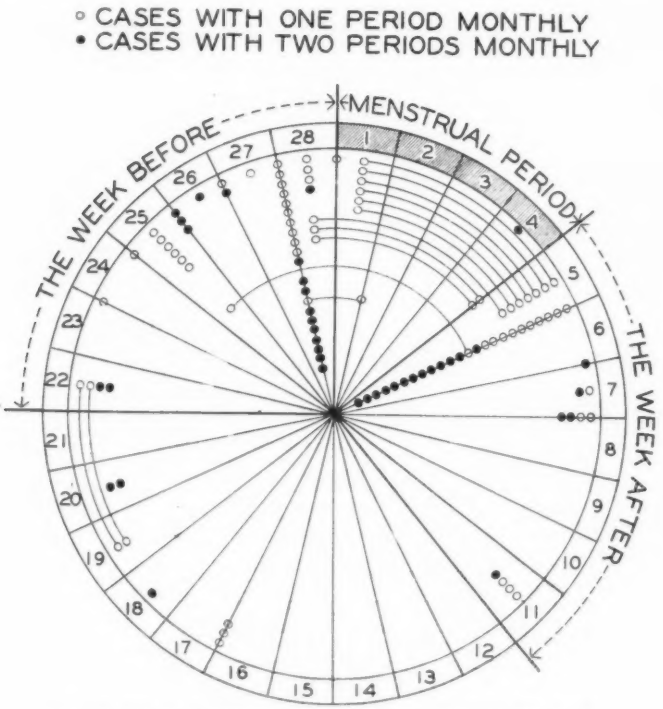

Chart III. Frequency of sex desire. Seventy-six cases.

The practical coincidence in women of the period of maximum desire with the period of maximum fertility is generally accepted. During the last ten or twelve years, there has been a good deal of work done on the most probable time for the occurrence of conception. The subject has been approached from different directions, such as the studies of pregnancies resulting from isolated coitus by Siegel, Zangemeister, and others; ovulation in its relation to menstruation has been studied in abdominal operations by several surgeons such as Schroeder, Ruge and Fraenkel. Other investigators are at work on the same subject from other points of approach, notably, Frank, Papanicolaou and Jessie King.

I have been permitted to examine a collection of data on this subject prepared by Dr. Robert L. Dickinson. From this it would appear that while pregnancy may occur at any part of the menstrual cycle, it is most likely to occur in the week following the menstrual period. This coincides with the period of desire of *second* greatest frequency shown in Chart IV. Furthermore, the studies quoted above seem to show that in our group of 200 cases, the time of highest frequency of sex desire coincides with the period of least likelihood of conception.

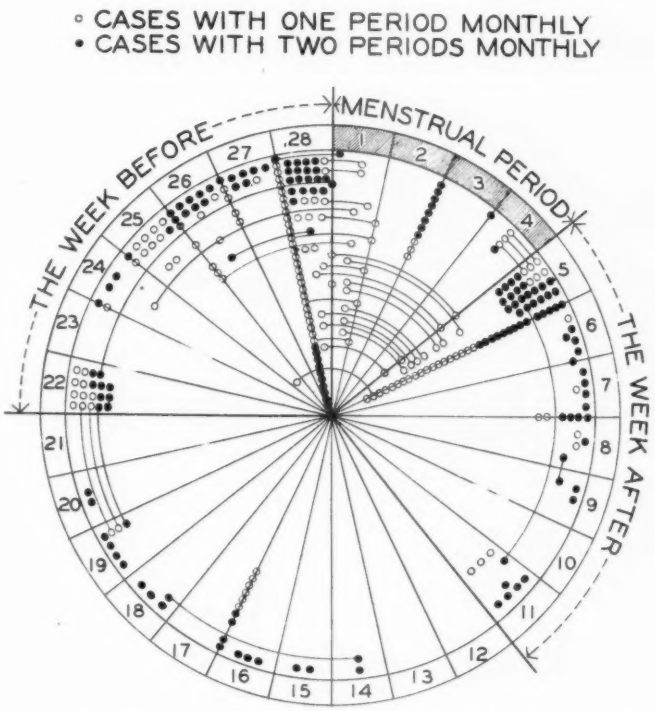

Chart IV. Periodicity of sex desire. 200 cases. Combined chart—110 unmarried and 76 married women—with the addition of 14 cases, 4 married and 10 unmarried not included in the remainder of the study.

CORRELATIONS AND COMPARISONS WITH THE UNMARRIED WOMEN'S GROUP

As in Part I of this study (Unmarried Women), certain correlations have been made to discover in what ways, if any, this group of women who observe periodicity of desire differ from the total group. The same correlations have not all been made in Part II, inasmuch as the material available was not identical. For the sake of comparison, they have been made wherever possible.*

*In these correlations the subgroups into which the 126 cases of regular periodicity might be broken up give too small numbers to be treated statistically.

1. *Age.*—The average of the total group of married women is 38.3 years. That of the group recognizing periodicity is 36.5 years. The difference is too small to be significant as was the case with the unmarried women where the figures were 37.4 years and 36.8 years respectively.

2. *First Remembrance of Sex Feelings.*—The questionnaires for married and unmarried women were not identical. For the latter the questions were grouped topically. Those relating to sex feeling began as follows:

A. *Sex Feeling.* Section III.

1. (a) Do you recall having had any sex feelings or impulses during childhood (up to beginning of menstruation)? Spontaneous (physiologic) excitation of organs; pleasure in handling organs; desire for sex excitement; sex day dreams; curiosity about sex affairs of parents or other adults; strong attraction for boys and men; any other?

The questionnaire for married women was divided into age periods. Under Section B, Childhood to Fourteen Years, question 8 reads:

8. Do you recall having had any sex feelings or impulses during childhood? (Up to about fourteen; pleasure in handling organs; excitation of organs; desire for sex excitement; sex day dreams; curiosity about sex affairs of parents or other adults; strong attraction to boys or men.)

There is a difference, it will be observed, in the time limit as menstruation does not occur in all cases at 14.

We find when we compare the numbers in the two groups of 1000 each of married and unmarried women, that the number recalling sex feeling in childhood is almost identical, being 461 for the married and 463 for the unmarried.

Comparing the total group of married with the 126 who observe regular periodicity of desire in respect to sex feeling in childhood, we find 461 or 48.1 per cent (41 of the 1000 failing to answer this question) among the former and 99 or 78.6 per cent among the latter group. This difference of 30 per cent is certainly significant and corroborates the findings in the case of the unmarried. It seems to indicate that where sex feeling as a child was sufficiently strong to be remembered, there is greater likelihood of periodicity of sex desire strong enough to come into consciousness.

3. *Sex Problems.*—In the questionnaire for married women there were no questions which definitely asked for the statement of sex problems, and although some qualitative material is presented by those answering other questions, it does not lend itself to statistic treatment.

4. *Education.*—The group of unmarried women were all college graduates. In the group of married women 68.1 per cent were college women.

In the group of 126 recognizing periodicity there were 82 women or 65 per cent who were college graduates. The difference of 4 per cent is not significant.

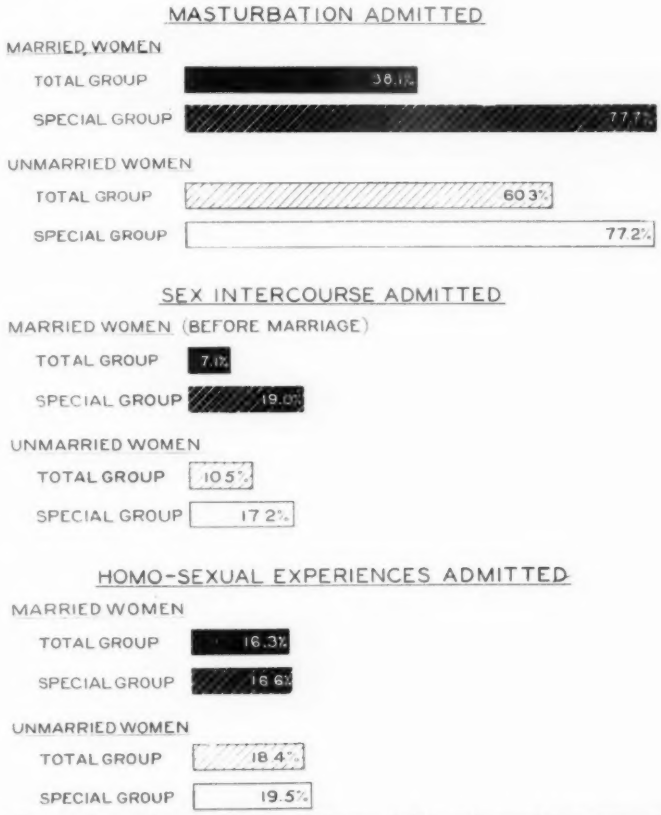

Chart V. Comparison of sex practices between total and special groups of married and unmarried women.

5. *Sex Experiences.*—In the comparison of the groups of married and unmarried as to sex experience, we have taken into account in the case of the married only those which preceded marriage. We find that while 65.9 per cent of the total group of the unmarried and 85.3 per cent of the special group admit sex gratification of some sort, among the married 48.6 per cent of the total group and 82.5 per cent of the special group make the admission. As to the significant difference between the two total groups, it should be borne in mind that the average age of the unmarried group is 37.4 years, while the average age at marriage of the married group is 25.7 years.

In the two groups which recognize periodicity, the percentages differ only by 2.8, which is not significant.

TABLE VI. AUTO- AND HETEROEROTIC PRACTICES PREVIOUS TO MARRIAGE

DESCRIPTION OF GROUP	MASTURBATION				HOMOSEXUAL EXPRESSION				SEX INTERCOURSE			
	TOTAL GROUP 1000		SPECIAL GROUP 126		TOTAL GROUP 1000		SPECIAL GROUP 126		TOTAL GROUP 1000		SPECIAL GROUP 126	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
All sex expression unanswered	8	0.8	—	—	8	0.8	—	—	8	0.8	—	—
All sex expression denied	506	50.6	22	17.5	506	50.6	22	17.5	506	50.6	22	17.5
Special sex experience unanswered	49	4.9	—	—	34	3.4	8	6.5	67	6.7	33	26.00
Special sex experience denied	570	57.0	28	22.3	803	80.3	97	76.9	862	86.2	69	55.00
Special sex experience admitted	381	38.1	98	77.7	163	16.3	21	16.6	71	7.1	24	19.00
Totals	1000	100.0	126	100.0	1000	100.0	126	100.0	1000	100.0	126	100.00

In this table all percentages are based on the total number in each group.

TABLE VII. DISTRIBUTION OF CASES SHOWING ONE AND MORE THAN ONE TYPE OF SEX GRATIFICATION

	MASTURBATION NUMBER OF CASES		HOMOSEXUAL EXPRESSION NUMBER OF CASES		SEX INTERCOURSE NUMBER OF CASES		TOTALS			
							TOTAL GROUP		SPECIAL GROUP	
	TOTAL GROUP	SPECIAL GROUP	TOTAL GROUP	SPECIAL GROUP	TOTAL GROUP	SPECIAL GROUP	NO.	PER CENT	NO.	PER CENT
One type only of sex gratification admitted	267	65	83	1	20	5	370	76.1	71	68.2
Two types admitted	101 { 65, 36	27 { 13, 14	67 { 65, 2	14	28 { 36, 2	13	103	21.2	27	26.0
Three types admitted	13	6	13	6	13	6	13	2.7	6	5.8
Totals	381	98	163	21	71	24	486	100.0	104	100.0

Table VI presents the data concerning auto- and heteroerotic practices of the married women previous to marriage.

An examination of this table shows a significantly higher percentage in the group recognizing definite periodicity, both of those who admit masturbation and sex intercourse before marriage over those in the total group. This comparison does not hold with reference to homosexual practices. The percentages in this case differ by a negligible amount (16.3 per cent as against 16.6 per cent).

Taking the recognition of periodicity of desire as the sole determining factor, it is apparently of importance as a factor in masturbation, particularly in later life and in leading to sex intercourse before marriage.

In Table VII the special group is broken up into subgroups too small in numbers to be really significant, but it is interesting to note that the per cent is considerably smaller in this group for those having one experience and higher for those with two or three experiences.

Chart V presents a graphic comparison of the percentages of those admitting the various sex practices in the total group of married and unmarried women, and in the special groups of those recognizing regular periodicity.

In spite of the fact that the group recognizing regular periodicity is twice as large among the unmarried women, it is interesting to note that there is a negligible difference of percentages between the married and unmarried who indulge in sex practices, namely, masturbation 77.7 per cent and 77.2 per cent; sex intercourse 19 per cent and 17.2 per cent; homosexual experiences 16.6 and 19.5 respectively. The striking thing in this chart is the ocular presentation of the almost identical percentages of homosexual experience in the total and special groups of both married and unmarried women.[1]

6. *Health.*—In Part I of this study, Table XIV, health correlated with recognition of periodicity of sex desire shows that there is no significant difference between the total group and the group recognizing periodicity in the percentages of those whose health was good or excellent at the time of reporting.

Table VIII of the study of married women compares the health of the entire group before marriage[2] with that of the group of 126 recognizing regular periodicity.

Here it will be observed there is a difference of 11.4 per cent between the groups. Taking into account the size of the two groups, this is large enough to warrant the statement that the special group had significantly poorer health before marriage than the group as a whole.

---

[1]Homosexuality will be treated at length in a forthcoming paper.

[2]We use "health before marriage" instead of "health at time of reporting" because the questions as to periodicity occur in the section of the questionnaire devoted to experiences before marriage.

It is fair to say, however, that the chances are greater in the case of the married women's group for misconceptions as to the time element, i.e., before or after marriage involved in the question of periodicity.

7. *Nervous Breakdowns.*—No definite question was asked in the married women's questionnaire on this particular point. In describing health before marriage, only 22 women cite nervous disorders. Where the definite question was asked of the unmarried, 301 women in the total group answered affirmatively as to nervous breakdowns or "near" breakdowns.

TABLE VIII. HEALTH BEFORE MARRIAGE CORRELATED WITH RECOGNITION OF DEFINITE PERIODICITY OF DESIRE

	SPECIAL GROUP 126		TOTAL GROUP 1000	
	NUMBER	PER CENT	NUMBER	PER CENT
Poor, very poor and fair	47	37.3	259	25.9
Good and excellent	79	62.7	741	74.1
Total	126	100.0	1000.0	100.0

Again we call attention in this connection to the fact that there was little difference in average age of the two groups at time of replying, —married women 38.3; unmarried 37.4, while the average age at marriage was 25.7 years.

8. *Pleasurableness of Initial Marriage Relationship.*—In a previous study we discussed the relationship of happiness of married life* and the pleasurableness of the marital relationship to the women. It was shown, for example, that in the group in which the initial relationship was pleasurable, there was a significantly higher percentage of happiness up to the time of reporting. In the present study we have examined the data to see if there is any relationship between the recognition of definite periodicity of desire before marriage and initial pleasurable experience in the marital relation.

A group of only 126 who recall definite periodicity is a small one on which to base a mathematic comparison, but we give the results as at least showing a trend.

Out of our total 1000, there were 655 out, or 65.5 per cent whose initial experience was pleasurable. Of the special group, 88 or 69.8 per cent reported pleasurable. The difference is 4.3 per cent. This is too small in itself to be significant. It may be the result of chance but it is an interesting possibility that there is a greater chance for pleasurable initial marital relations in the group which recognizes definite periodicity.

**The Happiness of Married Life*, Jour. Soc. Hyg., March, 1923, ix, No. 3.

If, however, we turn to the answers given to the question of the happiness of married life up to the time of report, we find that while 872 of the entire group, 88.2 per cent of those replying to the question, state that their married life has been happy, 107, or 86.2 per cent of our special group report enduring happiness.* That is, there is a lower rate of happiness in the 126 recognizing regular periodicity, though the difference is too small for definite conclusions.

Examining the reasons given in the sixteen cases where marriage was wholly or partially unsatisfactory, we find that in only two cases was it for reasons entirely apart from marital relations. In one instance the husband was an habitual drunkard, in the other he failed to support the family.

Among the reasons given in the fourteen other cases, is one case where the husband is unable to satisfy his wife sexually—(he is 23 years older). One husband is impotent; fear of pregnancy is cited in one case; husband "unable to perform the sex act properly," is given in one instance. In three cases the husband's demands are said to be excessive. One of the cases where the husband's moral outlook was changed in France during the World War belongs to this group, and in one instance the woman confesses that her own jealousy of her husband's attentions to other women makes her unhappy.

The 87.5 per cent of the total amount of unhappiness in this group due to sexual maladjustment is much higher than for the total group.†

CONCLUSION

As in the preceding papers, we do not undertake any interpretation of data. In this and the preceding paper on periodicity of sex desire we have classified, counted and correlated the answers given to the questions by 2000 well-educated women. As in all questionnaire studies of this type, we cannot go back of the returns. The papers themselves give evidence of honesty and careful consideration in replying.

It will be noted in this particular study that in a number of important correlations the data from the married women's questionnaire corroborates that obtained from the unmarried.

Two questions at least are raised which can only be answered by the work of competent investigators.

*Two of this group did not answer this question and one replied "neutral."

†In the total group it is impossible to fix accurately the percentage due to sexual maladjustment for the reason that we cannot analyze those cases where "incompatibility" without further explanation is alleged to be the cause, but the number of cases is too small to make it more than suggestive. See *Happiness of Married Life*, Journal of Social Hygiene, April, 1922, and January, 1923.

First: Why should there be a relationship between periodicity of sex desire and both masturbation and sexual intercourse, and none between periodicity of desire and homosexual expression? And second: Is there any explanation for sex desire showing a maximum around the menstrual period, while from late studies ovulation seems to occur in what has perhaps unscientifically, been considered *the safe period?*

370 SEVENTH AVENUE.

THE DISADVANTAGES OF THE PROLONGED PERIOD OF POSTPARTUM REST IN BED*

BY H. J. EPSTEIN, M.D.
Visiting Obstetrician, Bronx Hospital
AND
A. J. FLEISCHER, M.D.
Asst. Adjunct Obstetrician, Bronx Hospital, New York, N. Y.

WILL a prolonged period of rest in bed, or the shorter one, after childbirth be of greatest benefit to the patient, in supporting nature to carry out the function of the puerperal state? Both sides of the question have their supporters.

In 1773 White wrote on the value of an early return of the puerperal mother to activity. He allowed his patients, i.e., the normal cases, to sit up in bed within the first 24 hours, and ordered them out of bed on the fourth day. He found that these early risers, invariably, made better recoveries, were in less want for therapeutic adjuvants, such as enemata, purgatives, catheterization, etc., for bowel stasis or inability to void.

Playfair, in his textbook on midwifery, published in 1879, promulgated the practice of prolonged stay in bed; arguing, that since the complete process of involution requires a period of two months, the period of rest in bed would have to be, as a natural deduction, a more or less prolonged one.

In 1899 Küstner, in his memorable work on this subject wherein he made a thorough study of a large group of cases, expressed a similar view to that of White. He believed, that with the recumbent posture, the uterus had a tendency to fall backward, towards the hollow of the sacrum, the lower segment thereby being forced downward and forward, thus placing the supporting ligaments on the stretch, and in this way predisposing to retroversion and prolapse. On the other hand, with the patient in the erect posture, the fundus of the uterus was thrust forward, being supported by the symphysis, while the cervix was naturally pointed and carried upward, towards the sacrum, thus relieving the tension on all the supporting ligaments. This position, he claimed, was the most favorable one for the process of involution of the uterus and its ligaments, and thereby guarded against the possibility of displacement after involution had been completed. By following up these cases he found that prolapse occurred less frequently in the patient who had a short period of rest in bed, than in the one who had a prolonged period of "Bettruhe."

*Read at a meeting of the Section on Obstetrics and Gynecology, New York Academy of Medicine, January 25, 1927.

Von Alvensleben, in 1908, allowed a series of one hundred women, uncomplicated, to get out of bed from the first to the fourth day, postpartum. He found that these cases had better bowel movements, required less catheterizations, and had better muscle tonus, than those who had had a prolonged stay in bed. Only 10 of these cases were attended by fever, which he attributed to a demonstrable gonococcus infection. In the same year, Rosenfeld, citing 102 cases, one of which developed fever due to mastitis, allowed his patients to get up on the third day. He assumed, that since the etiology of prolapse was an atrophy of the pelvic floor, long rest in bed increased the muscular weakness. He therefore deduced, that the early use of these muscles predisposed to the restoration of the muscular tonus, and so made prolapse less frequent.

Halban and Tandler, in their anatomic treatise on the etiology of prolapse, believed, with Rosenfeld, that the main structural support in prevention of prolapse was the musculopelvic floor, centered about the levatores ani muscles. Twelve years later, Halban independently published his work, supplementing this theory, and asserted, that in addition to the levators, the fascia endopelvina, with its many reduplications, was a most necessary structure in the support of the uterus. He did not believe that the levators, independent of the endopelvic fascia, were the all important factors in the prevention of prolapse. This latter view is the one that has received the widest acceptance among modern gynecologists. From the work of Küstner, Rosenfeld, and Halban, it can be seen, that with the early resumption of activity, the levators are returned to early function, while the erect posture favors the relaxation of tension on the ligaments, and so allows them to return to their pregravid state, more rapidly, than with the patient in the recumbent posture.

We desire to present a study of 446 cases, uncomplicated, with reference to the duration of rest in bed after confinement. What benefits we were to derive, we did not, in our unprejudiced minds, dare to foretell. We were not going to be buried in a world of empiricism; as proclaimed by DeLee: "One must hesitate long before allowing a principle, grounded in thousands of years of empiricism, to be overthrown by a new theory." He does not allow his patients to get out of bed before the ninth day.

Forestalled by this same empiricism accepted by the patients themselves, we at first had great difficulty in convincing them that their early rising would not be attended by some disaster. But, it required only a handful of more intelligent patients to lead the others on, and convince them that the attending dangers were nil and that, if anything, early rising was beneficial.

Out of the 446 patients one left the bed on the third day postpartum, six on the fourth day, 192 on the fifth day, 92 on the sixth day, 62 on the seventh day, 60 on the eighth day, 31 on the ninth day, and two on the tenth day. The average day out of bed of this group, was the sixth day. Prior to being ordered out of bed, each patient was allowed to move about within the first twenty-four hours, to sit up within the first forty-eight to seventy-two hours. One has only to refer to the work of Aschoff[1] on thrombosis, to realize the value of this early activity in bed, in the prevention of thrombosis with result-

ant emboli. With this DeLee[3] agrees, as does Williams,[14] quoted by Mosher.[8]

We have also made it a practice to allow a patient to sit up in bed within the first twenty-four hours, if she was not able to void spontaneously while in the recumbent posture; and to get out of bed on to a commode, or accompanied by a nurse to the bathroom, if she did not have a bowel movement within the first seventy-two hours. After twelve hours, Reuben Peterson, allows his patients to be swung out of bed on to a commode, if she had not voided by that time; even in cases where sutures had been taken.

The natural question one expects is: "What is your morbidity?" The answer, relatively speaking, is "a minimum." In this group of cases there were no untoward accidents of any kind. Embolism, the most dreaded of all accidents, was conspicuous by its absence.

Before we discuss the question of fever, let us call attention once again to the fact, that this group of 446 cases were all spontaneous deliveries, so-called normal cases. In all there were 27 cases of fever, a morbidity of 6 per cent. Of these nine entered the hospital with upper respiratory infections, making a net total of 18, or a net morbidity of 4 per cent. In 180 spontaneous labors, Carl Henry Davis,[2] noted 21 cases of fever, three of which presented respiratory infections on admission, making a gross and net morbidity of 11.6, and 10 per cent respectively. There were 5 cases on the first day, 1 on the second day, and 1 on the fourth day, that ran temperatures up to 100.4°. Above 100.4°, there were 3 on the first day, 9 on the second day, 5 on the third day, 2 on the fourth day, and 1 on the sixth day, postpartum. Among the causes for fever, besides the 9 cases of upper respiratory infection on admission, are: 1 case of retained lochia; 7 of acute mastitis; 5 of so-called caked breast; 1 of follicular tonsillitis; 1 of acute salpingitis (history of gonorrheal infection); 1 of bowel stasis, relieved by enemata; and 2 of secondary anemia, where there were postpartum hemorrhages, the patients ultimately recovering. The highest temperature was 105.2°, in a severe case of grippe.

CONCLUSIONS

The results that we obtained, after a year's observation, are on a parallel with those of White, Küstner, Von Alvensleben, etc. The well-being of the patient in the puerperal state, in uncomplicated labors, seems to vary inversely with the duration of the period of rest in bed. The use of the catheter is reduced to a minimum. Spontaneous evacuation of the bowel in the early rising patient has become more prevalent. The general muscular tonus has improved more rapidly, and approached the pregravid state in a much shorter period

than is usually the case. The early rising of the patient seems to have quickened, rather than prolonged the involution of the uterus and its supporting structures. We believe that these good results follow the employment of an orthopedic principle, probably foreseen by Küstner and White, years ago, namely, that an injured muscle or fascia, with a minimum amount of rest, and the early introduction of passive and active motion, will sooner recover its normal tonus and strength, than the one which is subjected to a prolonged immobility, thus predisposing to atrophy and loss of tone.

In addition, early motion according to Aschoff, prevents venous stasis, thus precluding the possibility of thrombosis with resulting embolism. Aside from the pelvis itself, the rest of the musculoskeletal system of the patient benefits in a like manner, as do the blood-vascular and excretory systems. Morbidity, in the form of fever resulting from pelvic pathology, is decreased, rather than increased, by early rising, in uncomplicated cases.

REFERENCES

(1) *Aschoff, Ludwig:* Arch. Int. Med., Nov., 1913, pp. 503-525. (2) *Davis, Carl Henry:* Surg. Gynec. and Obst., Oct., 1926, p. 519. (3) *De Lee:* Practice of Obstetrics, ed. 4, Philadelphia, W. B. Saunders, 1924. (4) *Halban, Josef:* Operative Behandlung des weiblichen Genitalprolapsus unter berucksichtigung der Anatomie und Atiologie, Wien und Leipzig, 1919. (5) *Halban und Tandler:* Anatomie und Atiologie der Genitalprolapsus beim Weibe, 1907. (6) *Küstner, Otto:* Bettruhe. Verhandl. Deutsche path. Gesellsch. f. Gynäk., viii, 530. (7) *Markoe, J. W.:* Jour. Am. Med. Assn., Oct. 7, 1916, p. 1066. (8) *Mosher, G. C.:* Am. Jour. of Obst., 1911, lxiv, 617-625. (9) *Mullerheim, R.:* Berliner klin. Wchnschr., Nov. 8, 1909. (10) *Playfair, W. S.:* System of Midwifery, 1880. (11) *White:* The Treatment of the Pregnant and Puerperal Women, 1775, v, 304; Ac. of Med. N. Y., pp. 34-37. (12) *Rosenfeld, W.:* Gynäk. Rundschau, 1908, 21. (13) *Von Alvensleben:* Ztschr. f. Gynäk., Sept. 5, 1908. (14) *Williams, J. Whitridge:* Obstetrics, N. Y., 1921, D. Appleton & Co.

1738 Crotona Park East.

2240 Grand Concourse.

THE DIFFERENTIAL DIAGNOSIS OF RIGHT-SIDED ABDOMINAL PAIN*

By Urban Maes, M.D., New Orleans, La.

EVERY acute abdominal condition is a potential catastrophe; every such condition which goes unrecognized or is handled by temporizing measures is an inevitable tragedy; and the basis of the successful management of all intraabdominal pathology lies primarily in prompt and accurate diagnosis. So incontrovertible are these facts that at first glance it might seem almost an impertinence for me to come before you tonight, in response to your kind invitation to address this Society, with another paper on the time-worn theme of the differential diagnosis of intraabdominal crises. On the other hand, as Sir Berkeley Moynihan once wisely pointed out in this same connection, much paper and much poverty may coexist, and it is not the settled problems of medicine about which much is written, but rather those matters upon which light still needs to be shed. I might add that nothing more clearly proves the need for light and still more light upon this special theme than a study of our formidable death rate in emergency surgery of the peritoneal cavity.

The blame for this state of affairs must be shared equally by the surgeons and the medical men. Too often the patient is referred to us in extremis, and we operate, not because we have any real expectation of saving his life, but simply because it is automatic with us to administer the last rites of our profession, as it were. For our own part, however, because it is so fatally easy to open the abdomen and investigate conditions within at first hand, we are too prone to operate on a haphazard diagnosis or none at all—I pass over with the scorn they deserve the pseudoaccurate diagnoses of the "acute abdomen" and the "surgical abdomen"—forgetting that the scientific practice of the art of surgery presupposes the identification of pathology and the fixing of indications before resort is had to the knife.

Chronic diseases of the peritoneal cavity need not concern us here. Since there is no need for haste, all the evidence in the case may be weighed, the history and physical findings may be studied in detail, laboratory examinations may be made as indicated, even the temporizing measures which should be heartily condemned when we are brought face to face with abdominal emergencies may be tried, and the course which is finally adopted is therefore likely to be, humanly speaking, the one best fitted to the needs of the case. In the acute condition, on the other hand, promptness of decision and action are all-important,

*Read by invitation before the New Orleans Gynecological and Obstetrical Society February 10, 1927.

there is no time for elaborate laboratory data to be secured, and an anguished patient and an anxious family all too often force one to supply the relief or to take the action which one's better considered judgment would emphatically forbid.

Practically every organ within the peritoneal cavity may be the seat of disease which, in some of its manifestations, at least, resembles the diseases which may arise in other similarly located organs. Thus we may have appendicitis, biliary pathology in its various phases; renal colic; displaced kidney; internal hernia; intussusception; volvulus; ordinary intestinal colic; acute pancreatitis; mesenteric thrombosis; renal and perirenal abscess; the rupture of any of the hollow viscera, as in gastric or duodenal ulcer, tubal gestation, or gall bladder diseases; torsion of the spleen or of an ovarian tumor; and such extraabdominal complications with referred abdominal pain as diaphragmatic pleurisy, frequently with associated pneumonia, acute osteomyelitis of the spine, and the gastric crisis of tabes dorsalis. Many of these, at first glance, carry on the surface the earmarks of their identity, but when the reports from various clinics are considered, it is evident that this is far from being the case. To cite but one instance, in one thousand cases of tabes dorsalis, surely a clear-cut clinical entity, exactly 10 per cent were operated upon during a gastric crisis for gastric ulcer, gallstones or appendicitis, which gives some idea of the confusion which exists, at least from the diagnostic standpoint.

In all of these diseases there is a definite, though often overlapping symptom complex, of which pain is the constant and outstanding feature. It is always of sudden onset and intense character, and most often, no matter where the true pathology is located, it originates in the region of the umbilicus. Pain which later radiates to the right iliac fossa suggests appendicitis. Pain which radiates to the right hypochondrium suggests gall bladder or liver pathology. Pain which radiates to the scrotum or testis in the male or to the labia in the female suggests some kidney condition. The pain of a ruptured tube eventually localizes in the true pelvis, as does the pain of simple tubal disease. Diaphragmatic pleurisy, liver abscess or gall bladder disease in which distention of the organ is a feature, frequently exhibits associated pain in the right shoulder blade, in addition to the abdominal pain. Moreover, the pain which arises from the rupture of a hollow viscus, as the stomach, the fallopian tube or the gall bladder, is immediate and agonizing in its intensity, while the acme of such conditions as intussusception, biliary colic, or the torsion or displacement of an organ or tumor is reached more gradually.

Vomiting characterizes practically all of these intraabdominal conditions, but the single act, occurring at the onset of the disaster, is of little significance. When it is repeated and continued it may sig-

nify anything from peritoneal irritation to complete intestinal obstruction, although true fecal vomiting occurs only in the final stages of obstruction of the large bowel or in the rare instances of gastrocolic fistula. In the late stages of peritonitis and in intestinal obstruction nausea does not accompany the act, as it does early in appendicitis, for instance, and the vomiting is little more than a mechanical regurgitation of the jejunal contents. Examination of the vomitus, however, may occasionally throw light on a doubtful condition.

Immediate collapse is not an initial feature of any of these conditions except tubal pregnancy. At a later stage it is especially marked in such conditions as acute pancreatitis, ruptured gastric or duodenal ulcer, and torsion of the spleen or of an ovarian tumor, and its appearance in acute inflammatory processes is the sign of a terminal and overwhelming toxemia. It might be well to comment, too, on the period of calm, frequently so dangerously misleading to the inexperienced, which follows the temporary collapse of the patient in ruptured ulcer or perforation of a gangrenous or ulcerative appendicitis, and which is always the precursor of peritonitis.

The degree of temperature is of little assistance. In practically all intraabdominal pathology it may be normal, elevated or subnormal, and my own experience is that it is most unusual to find any of these conditions exhibiting a temperature elevation of more than 101°. Elevation, it is true, is the rule in inflammatory processes, but it is a late and not an initial symptom, and more than once I have seen all degrees of pathology in the appendix, including gangrene, accompanied by no fever at all.

The pulse rate is of equally little assistance. As Moynihan has repeatedly pointed out, even in such catastrophes as the rupture of a viscus it may remain normal for some time afterwards, and while in ruptured tubal gestation it may swiftly become alarmingly rapid and weak, this is due to hemorrhage rather than to the tubal rupture. It is less affected in pelvic pathology than in appendicitis.

The localization of rigidity is always a sign of pathology in the underlying viscus, and is usually a most valuable diagnostic aid. It should always be supplemented by the endeavor to find the point of tenderness, "the area of supreme resistance," as Moynihan calls it, within the unyielding protective wall. In this connection, however, it should be remembered that a displaced organ may mean that this sign is absent, as when the appendix is in contact with the nondemonstrative area of the parietes. Similarly, a displacement may result in diagnostic error, as in a case of my own, operated on with a diagnosis of acute appendicitis, which proved to be acute cholecystitis, the ptosis being so extreme that the entire organ occupied the normal position of the appendix. Moreover, the fact of muscle fatigue, as studied by Cope, should not be lost sight of; he points out that

fatigue of the reflex is a physiologic phenomenon which is bound to occur when a state of contraction has lasted beyond a certain length of time, so that the absence of local rigidity does not necessarily mean the absence of local pathology.

The presence of a distinct tumor mass is naturally a valuable aid to diagnosis, but only if it is constantly present can a definite neoplasm be diagnosed. Tumors which increase rapidly in size suggest a twisted tumor or organ, a localized abscess, or intraabdominal hemorrhage, while tumors which vary in size and consistency, and which tend to disappear and reappear, are practically always of intestinal origin, with their presence and absence dependent upon intestinal peristalsis.

How then, with this confusing array of duplicating and overlapping symptoms, is one to differentiate between the various abdominal conditions which constitute the bulk of our surgical emergencies? In the first place, certain general facts, many of them frankly based upon the laws of probability, must be borne in mind. Thus the age incidence of certain diseases is to be considered. Appendicitis does occur, though infrequently, in the extremes of age, but it is most usual during adolescence, and it is the most usual cause of an abdominal crisis during this period. Intussusception is most usual in very young children. Malignancy is the commonest cause of intestinal obstruction in adults of forty-five and over. Acute pancreatitis and acute biliary conditions, while they may occur in children, are most common in adult life. Ruptured ectopic pregnancy can occur only in women during the childbearing period.

Rather more obvious is the sex incidence. Such conditions as ruptured ectopic pregnancy, salpingitis, ruptured or twisted ovarian tumor, need obviously be looked for only in women. Large series of cases likewise prove that certain other conditions are more common in women than in men, as perforated gastric ulcer, biliary colic, torsion of the spleen, and displacement of the kidney, while acute pancreatitis, perforated duodenal ulcer and renal colic are more common in men, facts which are by no means universal but whose recollection may be helpful. I might say, too, that no woman should ever be subjected to laparotomy for a supposed intraabdominal lesion without a careful vaginal examination.

Experience likewise teaches us that certain diseases are prone to stage their onset rather definitely at certain hours. Acute appendicitis, for instance, commonly occurs in the early morning hours, waking the patient from sleep. Gall bladder colic tends to come on at midnight or thereabouts. Perforation of a gastric or duodenal ulcer occurs after meals, while torsion of an ovarian cyst, rupture of a tubal pregnancy and similar accidents are likely to happen in the daylight hours, particularly after unwonted exertion.

The so-called abdominal facies is a characteristic sign of such grave abdominal catastrophes as the rupture of a hollow viscus, the perforation of an appendix, and acute pancreatitis, while it is never apparent in such ephemeral conditions as intestinal or renal colic. Equally characteristic is the decubitus. The patient with acute appendicitis lies with his right leg drawn up, the patient with peritonitis lies with his knees raised, in an effort to relieve the abdominal tension. A patient suffering from some form of colic tosses restlessly about, seeking new positions to relieve his pain, and the patient with a ruptured tubal abortion also moves with the restlessness characteristic of loss of blood and air hunger. On the other hand, the patient with a ruptured hollow viscus lies rigid and motionless, afraid even to move a muscle. Asking the patient to turn over in bed and noting the manner in which he obeys is a simple method of determining in most instances the gravity of the condition which confronts you.

Pulse and temperature we have already commented upon as being unreliable guides, but they should never be overlooked, especially in children. The method of respiration should be observed particularly, to note whether it is of the thoracic or the abdominal type, and in obscure cases careful observation of the alae nasi may furnish the first clue to an early pneumonia. Frequently in abdominal conditions, however, the respiration rate may be increased, as a sort of compensation to the rigidity of the abdominal wall. Cope in this connection calls attention to the value of the ratio between pulse and respiration; normally 4 to 1, in respiratory disease it is materially reduced, and a ratio of 2 to 1 is a definite indication of pneumonia. Finally, an x-ray examination will frequently establish the differential diagnosis and reveal a central pneumonia, with signs not yet evident on auscultation, a condition, it might be added, which simulates appendicitis in adults as well as in children.

Laboratory examinations are sometimes of definite value. A blood count should be made, for instance, in every case in which appendicitis is suspected, though sometimes I am inclined to believe that Ochsner was right when he advised the surgeon to make a blood count, remove the appendix, and then look at the report. At any rate, in the average case of appendicitis the white count does not run above 14,000, with some 80 per cent of polymorphonuclears. Higher than this, it suggests pneumonia, or salpingitis. In the latter condition the white count is uniformly high, and in ectopic pregnancy, as Farrar has pointed out, it tends to fluctuate, decreasing as the hemorrhage is checked and the free blood absorbed. A urinalysis should be routine, not only to eliminate renal conditions which might contraindicate or limit surgery, and to decide the type of anesthesia to be employed, but also to eliminate renal calculi, and pyelitis, a possibility always to be considered in children and in pregnant women.

Most important of all diagnostic points is a carefully elicited and interpreted history. As Moynihan well puts it, "The catastrophes which occur within the abdomen are not, strictly speaking, 'acute'; they are, on the contrary, usually the result of abrupt transition from a quiescent to an acute phase in a disorder of long standing." Thus, to mention but a few instances, a history of similar previous attacks, perhaps milder, can usually be elicited in appendicitis in a young person, while the middle-aged or old patient will give a history of so-called dyspepsia. Previous jaundice is pathognomonic of gall bladder disease, a history of previous digestive disturbance is equally suggestive, while a history of gaseous distention or oppression in the epigastrium, definitely related to meals and relieved almost instantly by eructation or vomiting, is characteristic. Rapid loss of weight in a previously healthy individual is significant of malignant disease undergoing an acute inflammatory process, while intestinal tuberculosis may furnish the same symptom complex, although the progress of the lesion is less acute. A perforated gastric or duodenal ulcer has always given its warning, not only in a long train of digestive symptoms, but in recent exacerbations, and it has been frequently pointed out that the regularity of the occurrence of pain following the ingestion of food, upon which point the patient should always be interrogated, is sufficient to establish the diagnosis. In ectopic gestation the story of a supposedly normal pregnancy, or possibly even a slightly delayed period, frequently following a period of sterility, is characteristic. Even in acute pancreatitis, perhaps the most infrequent of these intraabdominal conditions, there can usually be elicited a story of vague discomfort or mild pain in the upper abdomen for some days previous.

Last of all, a diagnosis may usually be arrived at by exclusion, if all other methods fail. A definite mental rehearsal of all possible conditions, even the most unlikely, may be a mechanical procedure, I grant, but in more than one instance I have seen an obscure diagnosis cleared up by it when more scientific reasoning had not brought light.

Space does not permit an attempt to consider the diverse pathology of the peritoneal cavity in any detail. Practically every condition, however, offers at least one salient feature upon which to base a diagnosis. Thus appendicitis should never be diagnosed as such without the presence of initial pain. A ruptured gastric or duodenal ulcer is always characterized by board-like rigidity of the abdominal musculature. The replacement of the organ, with the mechanical correction of the hydronephros, confirms the diagnosis of misplaced kidney. The characteristic pelvic findings, supplementing the equally characteristic history of supposed pregnancy, sudden abdominal pain, collapse, and a fluctuating leucocytosis, warrant the diagnosis of rup-

tured tubal pregnancy. Pain in the right hypochondrium, with referred pain under the right shoulder blade, supplementing a history of digestive disturbances in an obese, middle-aged individual, definitely suggests cholecystitis. In this connection, however, I might mention my own chagrin in operating upon a woman whose history and pelvic findings were entirely typical of an ovarian cyst, with twisted pedicle, but who proved to have a ruptured gall bladder, the contents of which were entirely pelvic.

Finally, we might briefly comment upon the treatment of these conditions. It is fairly generally accepted that any pain which lasts more than six hours in a previously well person, especially when it is accompanied by vomiting, an increasing pulse rate, and the characteristic abdominal facies, demands surgical intervention. Never under any circumstances should purgation be given to these patients. I agree with Moynihan that many of the fatalities, I believe he says all, of acute appendicitis are due not to the disease itself but to the aperients administered in a mistaken effort to relieve the symptoms. Equally important, morphia and similar anodynes should not be given until the diagnosis is clearly established. More than once I have been called in consultation to see a case of intraabdominal disease in which every symptom had been masked in this manner, and in which I was obliged to make the diagnosis, in the absence of every characteristic physical sign, on the history alone.

Last of all, if in doubt, operate. I hold no brief for promiscuous surgery, but I firmly believe that less harm is done in the occasional doubtful case, in which every diagnostic effort has failed, by an exploratory incision—of sufficient length, however, to permit a view of the abdominal contents—than is done every day by the temporizing measures and the "wait and see" attitude of the inexperienced medical man and his brother, the faint-hearted and timorous surgeon.

SUMMARY

1. The high death rate in emergency surgery for acute abdominal conditions makes it evident that the scientific method of handling these diseases is yet to be universally applied.

2. Practically every organ of the peritoneal cavity may be the seat of disease which in symptoms and physical findings simulates the pathology of other intraabdominal organs.

3. Pain is a constant feature in all of these conditions; other variable symptoms include vomiting, elevation of temperature, acceleration of the pulse rate and changes in its quality, rigidity, and the presence of definite masses.

4. In making a diagnosis, the following points should be considered: age, sex, time of onset, facies and decubitus, variations in pulse,

temperature and respiration, blood count and urinalysis, and, most important of all, a carefully interpreted history. Diagnosis by exclusion is possible if all other methods fail.

5. In spite of the confused symptom complex which these conditions exhibit, each of them offers one or more salient features upon which at least a working diagnosis may be based.

6. Surgery is indicated in most acute intraabdominal disease. Purgation is never indicated, nor is the administration of opiates until after the exact diagnosis is established. Exploratory laparotomy is justifiable in the small percentage of cases in which an exact diagnosis cannot be made.

REFERENCES

Cope, Z.: The Early Diagnosis of the Acute Abdomen, ed. 3, London Oxford Medical Publications, Oxford University Press, 1925. *Cope, Z.:* Clinical Researches in Acute Abdominal Disease, London Oxford Medical Publications, Oxford University Press, 1925. *Gould, A. P.:* Elements of Surgical Diagnosis, ed. 5, New York, P. B. Hoeber, 1920. *Moynihan, G. B. A.:* Essays on Surgical Subjects, Philadelphia, W. B. Saunders Co., 1921. *Moynihan, G. B. A.:* The Pathology of the Living and Other Essays, Philadelphia, W. B. Saunders Co., 1910.

1671 OCTAVIA STREET.

(For discussion, see page 401.)

TRACHELOPLASTY VERSUS TRACHELOPLASTERING*

BY M. O. MAGID, M.D., NEW YORK, N. Y.

WHILE many operations on the cervix are claimed to be modifications of the tracheloplastic operation devised by Sturmdorf, they are in reality entirely different procedures. Judging by the reasons presented for these modifications, it is evident that the fundamental principles upon which they are based are not those which prompted Sturmdorf's technic. It would only be just to the Sturmdorf operation to call these modifications, "tracheloplastering" operations and not the "tracheloplastic" operation.

Despite the fact that there are many of our confreres who agree that surgical treatment is the only means of eradicating chronic endocervicitis, many are using other methods, such as intracervical injections of drugs, with the hope of cicatrizing the deep glands of the cervix, the needle cautery with the same object, and the ordinary cautery which, when applied to the cervical canal, causes a sloughing of the superficial epithelium with occlusion of the ducts of the racemose glands. The reason advanced for these procedures is that the patients are relieved of the discharge without being hospitalized. These advocates fail to realize that the discharge is only one of the

*Read at a Meeting of the Section of Gynecology, New York Academy of Medicine, January 25, 1927.

symptoms of chronic endocervicitis. The ultimate outcome of such indiscriminate use of a dangerous instrument will only manifest itself later.

This paper will deal chiefly with the surgical treatment of chronic endocervicitis, contrasting the technic devised by Sturmdorf with the many modifications practiced. This latter phase of the subject is important because the end-results, be they good or bad, are credited or debited to the original Sturmdorf operation. This is unfair, since a good operation which can be correctly performed may be and usually is discredited by modifications.

With our present knowledge of the pathology of chronic endocervicitis as given to us by Sturmdorf together with his description of the muscular mechanism of the cervix, one can readily see the reasons

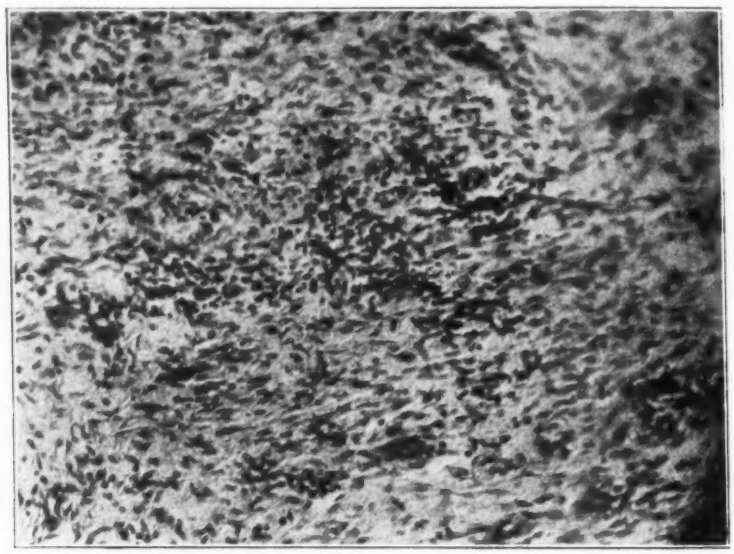

Fig. 1.—Showing dense round cell infiltration in the muscular stroma from a case of chronic endocervicitis one year after cautery treatment.

for the several important steps in his operation. He tells us that his aim is to remove the cervical lining which is diseased and to reline the canal with healthy vaginal mucosa which is devoid of any racemose glands. He emphasizes also that the musculature of the cervix should be damaged as little as possible so as not to interfere with the diaphragm-like action of the cervix during labor, for the musculature of the cervix is not arranged to form a sphincter because its fibers, which are continuous with those of the uterine body, do not at any point encircle the cervix, but are disposed in a serried succession of oblique circle segments, which by contracting spirally upward, necessarily shorten every diameter of the uterus, and by their uncoiling in the cervix, widen the os like an iris diaphragm in a microscope.

This problem which Sturmdorf set out to solve, he has successfully accomplished. In a previous communication, I published a series of case records of patients who had been operated upon by Sturmdorf or myself and whose records of later delivery at a hospital were included. Many other records of cases who were delivered at the homes of patients were not included. None of these cases presented any difficulty in labor.

For the exact technic of the Sturmdorf tracheloplastic operation, reference may be made to the author's book on this subject. Many modifications have been proposed. One is based on the fear of too much bleeding, and the danger of damage to the circular artery is sought to be overcome by a preliminary ligation. From the direction emphasized by Sturmdorf, that the scissors must stick close to the mucous membrane that is being denuded and remembering that one is not to go too high up on the lateral aspects of the cervix, it is hardly possible to cut the circular artery.

Another modification is the insertion of two heavy ligatures laterally to act as guy ropes on the cervix instead of the laterally placed tenaculae. This modification adds nothing to the technic but, on the other hand, it impairs circulation.

Another modification deals with the manner of coring out the diseased mucosa. This author advises bilateral splitting of the cervix, then cutting away the mucous membrane of the cervix in two parts. He suggests a submucous half purse string suture beginning at the angle of the wound. When the opposite angle is reached, the needle enters the canal and comes through the flap. The suture is completed by bringing it through the opposite angle. By these modifications, he makes a complex operation, produces more trauma, more scar tissue and violates the underlying principles of the Sturmdorf operation. Cases operated on in this manner must yield poor obstetric end-results.

Some resent the use of silkworm gut and advise the using of chromic catgut. Assuming that the operation is performed strictly in accordance with the technic described for the tracheloplasty, with but this exception, the results in many instances were not good because the catgut had been absorbed too early, resulting in a gaping discharging wound. Why use catgut when silkworm gut has been found to be a better suturing material, since it also helps drainage? Removal of the silkworm gut can be accomplished by a little practice.

In a comparatively recent edition of a popular book on "Diseases of Women," the author mentions the Sturmdorf operation, quotes the principles underlying the technic, and gives several illustrations that are unique and original with the author. Anyone knowing the Sturmdorf technic can at once see that these pictures are not at all descriptive of the tracheloplastic operation. Those surgeons, however, who

would allow themselves to be guided by such pictures, must have poor end-results. These end-results are also erroneously credited to the Sturmdorf operation.

There are more modifications and many more will come to our attention until the profession realizes that the tracheloplastic operation as devised by Sturmdorf is excellent in every respect. Unless the surgeon follows the exact technic, he has no right to attribute his failures to the operation as devised by Sturmdorf.

Before discussing the cautery treatment in chronic endocervicitis, let us bear in mind that every curative attempt must have a definite aim and scope. The aim and scope must be based upon recognized pathology and etiology of the disease.

If Sturmdorf has done anything, he has established the pathology of endocervicitis as a clinical entity. Today all pathologists agree with him that the so-called erosion and eversion and ulceration are part and parcel of an endocervicitis which involves the cervical mucosa from the external to the internal os. If we agree upon this pathology, the rational cure of chronic endocervicitis must remove the endocervical mucosa in its entirety and reestablish the cervical canal, maintaining the muscular function of the cervical musculature. This the tracheloplastic operation, unmodified and correctly executed, will accomplish in nearly every case without complications.

Compare this with the cautery treatment. The first rule of cautery treatment is to avoid the cervical canal, so as to prevent stenosis—notwithstanding which, stenosis frequently occurs. The advocates of the cautery claim that the cicatricial contraction being longitudinal obviates stenosis. This is a fallacy. The cauterization is longitudinal, while the tissue destruction is latitudinal with ultimate cicatricial contraction. This applies with greater force to the deep puncture advocated by some.

The so-called cure of the erosion or ulcer is a misinterpretation of end-results. Microscopic sections showed plainly that the apparent healing is a substitution of cicatricial tissue in the place of the transparent endocervical epithelia which originally covered the so-called eroded area; but most important of all, microscopical examination of so-called cures by the cautery revealed plainly in every instance that the pathologic infiltration or ascending lymphangitis from the infected focus within the cervix continues as actively as before. In other words, to treat the area around the external os for so-called erosion is to treat a symptom and not the disease.

As to the leucorrhea, which is only a symptom, the amount of secretion may be diminished by the obliteration of some mucous glands. Every case that has come under close observation shows a marked continuance of the discharge, provided the usual instruction to these

patients—to stop douching—is not given. If we agree on the pathology, how then can we agree upon the difference of radical treatment by tracheloplasty and the treatment by the cautery?

Let me quote from an advocate of the cautery who also advises the tracheloplastic operation in cases "where there exist more extensive and deeper infections with hyperplasia and cystic changes that may not be eradicated, with safety, by the cautery." His statistics on the "follow-up results" comparing the two methods are interesting and speak for themselves. In Table II of his series he shows that he treated by the cautery 55 cases where hospitalization and anesthesia were required; 28 were cured, or 51 per cent; 18 were improved, or 32.7 per cent, and 9 unimproved, or 16.3 per cent. By the tracheloplastic operation, 70 cases were treated, of which 49 were cured, or 70 per cent; 16 were improved, or 22.8 per cent, and 5 were unimproved, or 7.2 per cent.

Special attention is called to the fact that by the tracheloplastic operation, no attempt is made to treat leucorrhea, or the erosion or the laceration. The operation is for the cure of endocervicitis, which means that it acts as a prophylactic measure against future pelvic infections, ectopics, sterility and possibly carcinoma.

Is it not worth while to learn to do the radical operation properly which confines the patient to bed from twenty-four to seventy-two hours than to revert back to the discarded empiricism of fifty years ago?

REFERENCES

(1) *Thomas:* Diseases of Women, pp. 17-40. (2) *Sims:* Tr. Med. Soc. N. Y., Albany, 1861, pp. 367-371. (3) *Emmet:* Am. Jour. Obst., 1868-69, i, 339-362, 1874-75, vii, 442-456. (4) *Leonard, V. H.:* Surg. Gynec. and Obst., Jan., 1914, xviii, 35; 1913, xvi, 390. (5) *Sturmdorf:* Jour. Am. Med. Assn., 1917, pp. 42-53; Surg. Gynec. and Obst., January, 1916, pp. 93-104; Gynoplastic Technology, F. A. Davis, 1919. (6) *Magid:* N. Y. Med. Jour., October 5, 1921. (7) *Crossen:* Diseases of Women, 1922, pp. 459-460. (8) *Rottenberg and Schwartz:* Surg., Gynec. and Obst., Nov., 1924. (9) *Matthews:* Jour. Am. Med. Assn., Nov. 27, 1926, lxxxvii, 1802-1808.

UTERUS DUPLEX UNICOLLIS*

With Comments on Malformations of the Uterus

By Walter T. Dannreuther, M.D., F.A.C.S., New York, N. Y.
Professor of Gynecology, New York Post-Graduate Medical School and Hospital

THE formation of a normal uterus is contingent upon the fusion of the lower half of the apposed müllerian ducts with disappearance of the intervening duct walls, so that a single chamber (the uterine

Fig. 1.

cavity) is created. The point at which the wolffian mesentery, containing the müllerian ducts and remnants of the wolffian body and duct, and the genital fold cross each other is the area in which the differentiation of the original müllerian ducts into the fallopian and uterine segments occurs. Muscular fibers are developed in the sub-

*Read before the Section of Obstetrics and Gynecology, New York Academy of Medicine, February 22, 1927.

peritoneal tissues of the wolffian and genital mesenteries of the embryo, which in some way decussate and interlock, thus leading to a coalescence of the müllerian ducts. If the genital fold proves stronger than these interlocking muscle fibers, union of the müllerian ducts may be partly or entirely prevented, so that an intermediate arrangement becomes permanent. In most instances of malformation of the uterus there is a parallel development of the two sides, although in some cases the growth of one side may be arrested, the other pursuing its normal course.

There are six well-defined variations in malformation of the uterus, and every experienced gynecologist has probably encountered one or more examples of these developmental defects in his practice. Their

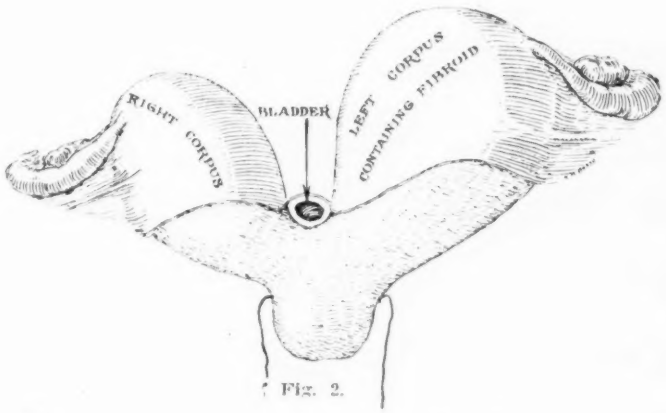

Fig. 2.

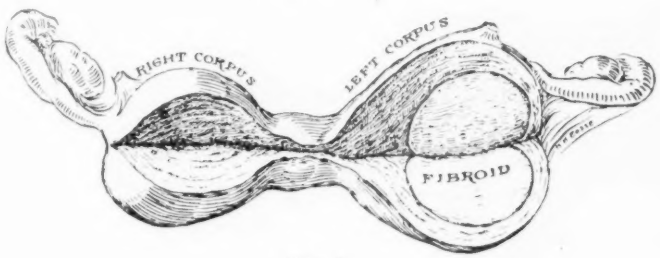

Fig. 3.

recognition is of importance chiefly because of their influence on the childbearing function, and the diagnostic difficulties they present when complicated by tumor formation, to which they seem to be prone. Although the legendary textbook teachings inform us that patients with uterine anomalies are usually sterile, a survey of current periodical literature, as well as my own experience, seems to prove quite the contrary. I have had 13 patients in twenty-one years with malformation of the female pelvic organs, 11 of whom were married; five of the 11 married women had never been pregnant, but the other six produced collectively 16 children and 11 miscarriages. Only three patients

had anomalies involving the vagina, and it is interesting to note that all three were sterile. The fact that eight of the 11 miscarriages were admittedly induced abortions is also worth mentioning.

I present the history of a patient from whom a specimen was removed that does not conform exactly to the specifications of any one of the usual types of uterine malformation.

Mrs. T. H., aged 44, was admitted to my service at the Post-Graduate Hospital on November 29, 1926. Menstruation began at 13, and was normal in time, duration, and amount from the date of onset. She had had 5 full-term children, delivered without difficulty, and 4 abortions, 3 of which had been induced. There was no reappearance of menstruation during pregnancy or lactation. For one year previous to admission the patient suffered from pain in the left lower abdominal quadrant, gradually increasing menorrhagia, and shortened intermenstrual intervals.

Bimanual examination disclosed a uterine corpus, normal in size, symmetry, consistency, and mobility, deviated slightly to the right. On the left side, I found an enlarged, hardened, pyriform, and symmetric structure, arising from a broad

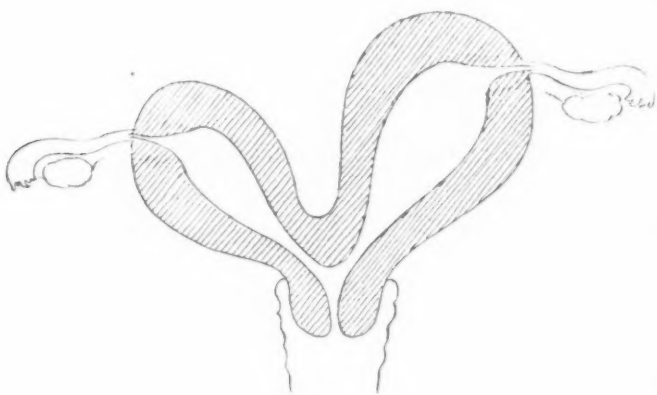

Fig. 4.

attachment just above the level of the internal os, which I believed to be a pedunculated fibromyoma. The adnexa were not palpable.

On opening the abdomen in the midline and clearing the pelvis of intestines, the posterosuperior aspect of two perfectly formed uterine bodies presented (Fig 1). The one on the left was larger than the other, but palpation determined that this was due to the presence of an intramural fibroid. The cleft between the uteri extended downward to the level of the internal os, which was located at a point just above the cervicovaginal junction. The visceral peritoneum covering the bladder and uteri was smoothly merged with that of the culdesac and rectum throughout the intrauterine cleft. The bladder was draped over the anterior aspect of each corpus, but its upper limit was found tucked into the sulcus between the bodies (Fig. 2). A normal tube and ovary were seen on each side. Preoperative examination having determined that the portio was smooth and healthy, a supravaginal hysterectomy was done, after incising the peritoneum on the posterior margin of the sulcus and freeing the upper limit of the bladder.

On opening the specimen, it was evident that each uterine corpus contained a normal cavity, lined with a normal endometrium, which communicated with a single cervical canal. The left uterus contained an encapsulated, fasciculated fibroid tumor (Fig. 3). Histologic examination showed that the endometrium was fully

developed in each corpus. The specimen cannot be properly classified as either a uterus didelphys or a uterus bicornis unicollis. Both corpora are fully developed and differ in size only because of the presence of the fibroid tumor. It is not a uterus didelphys because of the single cervix and cervical canal; and the very deep cleft extending all the way down to the level of the internal os, with the so-called rectovesical ligament lying in the sulcus, removes it from the group of bicornate uteri. It can best be described as a uterus duplex unicollis (Fig. 4).

The patient's postoperative convalescence was uneventful, and subsequent cystoscopic examination disclosed no abnormality in the urinary apparatus.

580 Park Avenue.

REPORT OF A FETAL SEXUAL ANOMALY

By Nathan L. Thompson, M.D., F.A.C.S., and J. Warren Bell, M.D., Ph.D., Everett, Wash.

Mrs. C., presented herself May 18, 1926, in the eighth month of pregnancy, with slight swelling of the limbs which increased in the next three weeks to the point where treatment was indicated.

Despite treatment she appeared one week later, June 15, 1926, with some edema of the abdominal wall and a trace of albumin, but with no increase in blood pressure, and a practically normal urinary output.

One week later she showed albumin ++, blood pressure 150/80 and many hyalin and granular casts. She was now approaching the ninth month of pregnancy. During this week her abdomen became much larger, indicating a polyhydramnios; she felt and looked sick.

Patient was placed in the hospital and labor started with castor oil and quinine. Labor did not progress very well and a bag was introduced. Labor then proceeded rapidly. When the bag, which was of large size, was expelled she was in active labor with practically complete dilatation. Large quantities of water had come away, on rupture of the sac, at introduction of the bag. An unsuccessful attempt was made to turn the posterior occiput into R.O.A. An easy forceps delivery was made of a dead eight and one-half months' deformed fetus.

Previous to this, after the water had come away, a diagnosis of a probable twin pregnancy had been made, though only one heart tone could be obtained, the reason for which was now obvious.

There was a large mass of cord all matted together. By means of a hemostat 9 loops were disengaged and the twin was extracted by easy breech. This baby was a female weighing 5 lbs., 12 oz., and normal in every way.

A description of the anomalous and deformed fetus and placenta follows:

The placenta was 20 cm. in diameter and about 3 cm. thick. Two umbilical cords were attached to the fetal side, near its center, at points about 5 cm. apart. There were no divisions in the umbilical sac and no visible division in the placenta. Membranes, amnion as well as chorion, were complete with the exception of one opening at a point opposite from the location of the placenta, through which the children had been delivered. The maternal side of the placenta appeared normal. We concluded this was the placenta of unioval twins, with one amniotic cavity.

The fetus weighed approximately 2250+ gm. (5+ pounds) and its length, from head to rump, was 28 cm. Both feet were clubbed (Bilateral talipes equino-varus) and the hands showed a corresponding deformity. The knee joints were very large,

but the movement was limited. There was diminished movement in the hips as well. The legs remained flexed at the hips and turned out, with flexion of the knees to 90.° Effort to straighten the limbs resulted in the fracture of the femur in the left leg. The development of the head appeared normal except for a high, narrow, palatal arch. The thorax appeared normal. Breasts showed no unusual development. The abdomen showed the presence of a median tumor, and by careful palpation its approximate limits were marked out, as well as the limits of a definite hard mass in the left upper quadrant. (Fig. 1.)

No rectal opening or dimple could be found. The genitourinary apparatus was not typical of either male or female development. The external organ consisted entirely of a conical shaped mass two cm. in height, and 1 cm. in diameter, remaining in an erect position. Its position was about that of a clitoris. There was a small opening on its ventral side near the tip, from which a drop of milky material could be forced out by pressure on the abdomen. No scrotum, labia, or vagina could be made out.

Fig. 1.—Fetus showing outline of tumor.

In order to learn more about the skeletal development a radiogram was made, with the exposure cut down. No bone was found in the tumor. There was a definite shadow, in the upper left quadrant of the abdomen, corresponding to the outline of the tumor.

In the lower abdomen was a large irregular cystic mass which measured 5x8 cm. It was composed of a median cavity, and on each side was another tense cyst somewhat smaller, terminating in a tube less than 1 cm. in diameter.

Between the median cyst and the left cyst was the lowest portion of the bowel, representing the descending colon, or sigmoid, filled with dark meconium. It terminated in a solid cord at a point above and behind the median cyst, about 4.5 cm., away from the normal location of the anus.

The excretory organ was opened and within was found a dilated cavity, which led through a thin tube into the median cyst. Before opening the tube a small sound was passed clear into the median cyst.

The appendix could be seen, at a point a little higher than normal, on the right side.

From the central cystic cavity, two tubes were traced upward, one on either side of the vertebral column, to a point a few centimeters below the diaphragm. Here each one ended in a dilated structure resembling the pelvis of a kidney, around which was a small clump of yellow-gray tissue (2x1 . 5x5 cm.).

Upon opening the left cyst 10 or more c.c. of milky fluid ran out. From the median cyst about 50 c.c. of the same kind of material, and from the right cyst about 20 c.c. This milky fluid was allowed to stand for a few days and a sediment (80 per cent by vol.) collected, leaving opalescent fluid above. Upon shaking and centrifuging the sediment was reduced to 20 per cent by volume. It consisted of large pavement epithelial cells with large amount of cytoplasm, and a dark staining nucleus, of moderate size, placed near the center. The opalescent fluid was acid and contained no urea. The specific gravity was 1050.

There were two ounces of orange-colored fluid from the pleural cavities. This fluid was acid in reaction, and contained 80 per cent, by volume, of albumin.

The stomach was in normal position. Pericardium and heart were normal. Lungs were collapsed, but showed normal divisions. The thymus was normal in appearance. Thyroid appeared normal.

Unfortunately the tissues were not secured for microscopic examination until after the second day, at which time some decomposition had taken place. There remained, however, sufficient unchanged tissue to be of considerable assistance in determining the time at which the anomaly occurred.

CONCLUSION

We are of the opinion that this combination of anomalies resulted from an arrest in development shortly after the period when the cloaca is replaced by separate structures for the discharge of reproductive, urinary, and digestive excretions. We consider the sex female because no male sex glands were found, because a female gland was found, and because the specimen was one of unioval twins, the other twin being of the female sex, and because of the presence of very definite structures representing fallopian tubes.

The relation of the rudimentary ureters and kidneys warrant, we believe, the opinion that the central sac was destined to become a bladder. The fact that all three sacs contained similar fluid, rich in epithelial cells, confirms the belief that they arose from a common anlage.

SARCOMA OF THE RECTOVAGINAL SEPTUM*

By Onslow A. Gordon, Jr., M.D., Brooklyn, N. Y.

(Clinical Professor of Gynecology, Bellevue Medical College; Obstetrician, Peck Memorial Hospital)

THIS case is presented for two reasons: First, because of the infrequent occurrence of vaginal sarcoma exclusive of sarcoma botryoid. Second, because of the apparent confusion of opinion among pathologists as to the histologic type of tissue in this case.

Mrs. D., 51 years of age, reported for examination March 12, 1926, complaining of irregular vaginal bleeding and a sense of pressure in the lower abdomen.

Her family history was irrelevant, there being no history of malignancy or constitutional disease. Her previous medical history was irrelevant. Her menstrual history showed that she passed an apparently normal menopause six years ago.

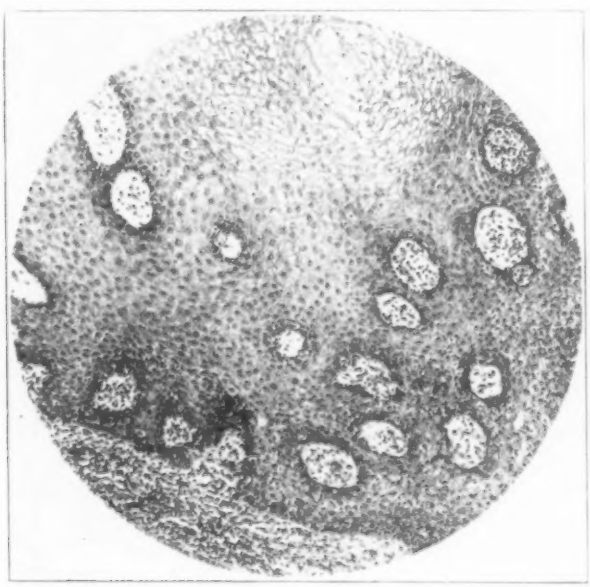

Fig. 1.—Mucosa and portion of submucosa, adjacent to neoplasm. The submucosa is densely invaded with inflammatory cells. No evidence of tumor in this area.

Her previous surgical history revealed a laparotomy in October, 1924, at the Peck Memorial Hospital at which time she was thought to have a large ovarian cyst. A retroperitoneal teratoma weighing 11 kg. (26 pounds) was removed together with the right kidney. Histologic examination of this tumor showed in places a disorderly arrangement of epithelial cells suggesting a potential malignancy. There was no evidence of sarcoma. At the time of operation the uterus, both tubes and ovaries were macroscopically normal.

Present illness.—The patient had noted moderate but gradually increasing metrorrhagia for four months, since November, 1925. She also noted for a short

*Read at a meeting of the New York Obstetrical Society, January 11, 1927.

time past a sense of pressure in the rectum especially upon defecation. She was otherwise in excellent condition and gaining in weight.

General physical examination was negative. She was apparently in good health, her weight being 182 pounds. Abdominal examination showed a fat and pendulous abdominal wall. A postoperative scar measuring 25 cm., largely above the umbilicus, was well healed. No palpable masses, no tenderness. Inspection of the vaginal introitus showed the mucous membrane of the anterior wall near the urethra to be friable and bleed easily over an area of about 1 cm. in diameter. There was a tumor mass apparently in the rectovaginal septum about 2 cm. above the sphincter, the mass being about 4 cm. in diameter. At several points it seemed to have eroded the mucous membrane of the posterior vaginal wall in a polypoid type of freely bleeding masses. There was no involvement of the cervix nor vaginal vault. No adnexal or parametrial pathology was palpable. The uterus was apparently small and senile. Rectal examination showed no ulceration of the rectal mucosa. The

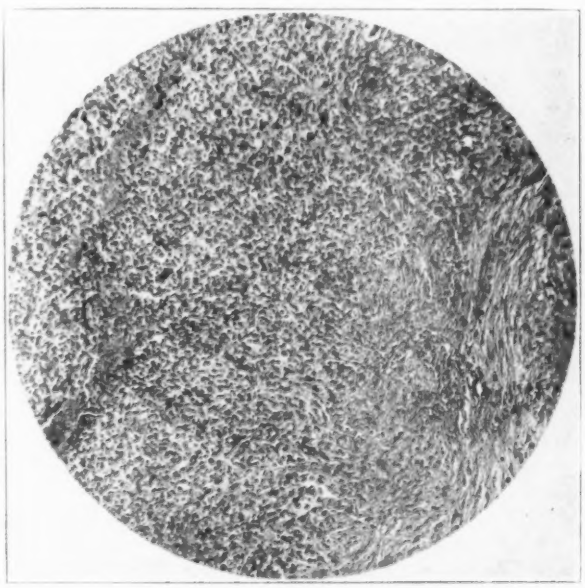

Fig. 2.—Area from neoplasm, frankly a malignant type of sarcoma, well vascularized. The neoplastic cells are of small round and short spindle type.

nodular mass under the posterior vaginal wall was plainly palpable anteriorly. A provisional diagnosis of sarcoma or malignant adenomyoma of the rectovaginal septum was made and biopsy advised.

The patient was operated upon March 13, 1926. The vaginal mucous membrane covering the tissue of the tumor under the posterior vaginal wall was reflected exposing a soft freely bleeding tumor mass about 4 cm. in diameter; this mass was removed by cautery. The small hemorrhagic area on the anterior wall was also cauterized. A specimen was sent to the laboratory.

Doctor Hala, pathologist to the Peck Memorial Hospital reported that the section of a portion of vaginal mucosa and underlying tissue showed the mucosa partly ulcerated and in other places thinned out by the presence of subepidermoid blood cysts. The underlying tissue consisted entirely of neoplasm and granulation tissue. The neoplasm was distinctly histioid, i.e., without definite or organoid structure. It consisted of densely packed, round, spindle and oat-shaped cells supported by

a diffuse delicate reticulum and wide, more densely fibrotic, trabeculae. The tumor was definitely sarcomatous and polymorphocellular in type.

As the neoplasm was of somewhat unusual interest slides were shown to two other pathologists. One was of the opinion that the tissue was not malignant but was excessive granulation tissue. The third opinion I will quote verbatum. "In the section of tissue of the vaginal wall, in the case of Mrs. D., I am unable to convince myself that there is anything more than granulation tissue. The tissue is extremely cellular at certain points, suggesting, as you say, a tumor process, but most of the material is composed of very numerous cellular blood vessels. I think it is safest to assume this process to be exuberant granulation tissue. This opinion may be altered by the subsequent course of the disease."

Twelve days after operation, March 25, vaginal examination showed several hard nodular masses along the posterior vaginal wall well above the location of the primary mass.

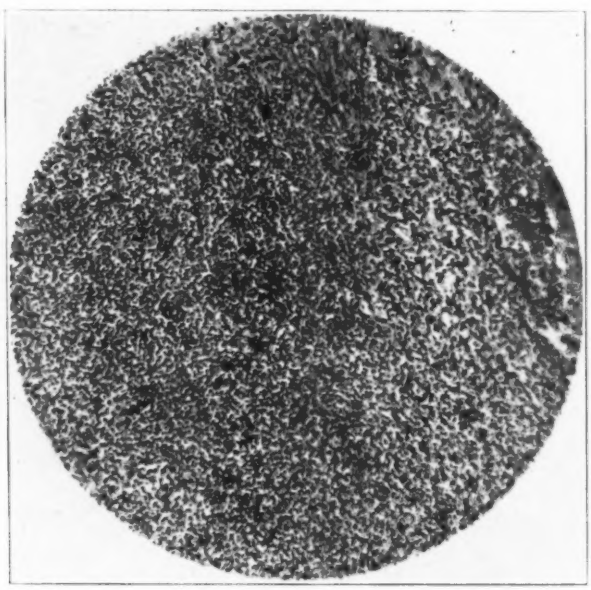

Fig. 3.—Area from neoplasm. Note the extreme vascularity and dense cellular structure.

Doctor William P. Healy was asked to see the patient in consultation on March 30. It was his opinion that the patient was suffering from a very malignant type of sarcoma. He suggested a radiographic examination of the chest and lumbar spine. The spinal radiograph was negative. From the chest examination Doctor Eastmond reported a mediastinal mass behind and external to the right side of the heart, probably metastatic.

On April 6, the patient was transferred to Dr. Healy's care at The Memorial Hospital, New York City, that she might receive intensive treatment by radium and x-ray. She was discharged from The Memorial Hospital April 16, following radiation and died at her home two weeks later from sepsis and cachexia.

As to the infrequency of occurrence of vaginal sarcoma, Robert Frank states that McFarland, in 1911, collected sixty-eight cases. He also says that these growths appear as nodular, sessile, polypoid or

more rarely diffuse stenosing growths. The anterior and posterior vaginal walls are most frequently affected. To quote further from Frank, "At first the vaginal epithelium covers these growths; later necrosis occurs and penetration of the neighborhood takes place. Huge necrotic hemorrhagic cystically degenerating masses may result." That is what occurred in this case.

Frank Lynch states that he is convinced that surgical treatment of these cases is of no avail. He further states that the prognosis is always death, that radiation is only palliative and that there is no record of a case surviving after five years following any method of treatment.

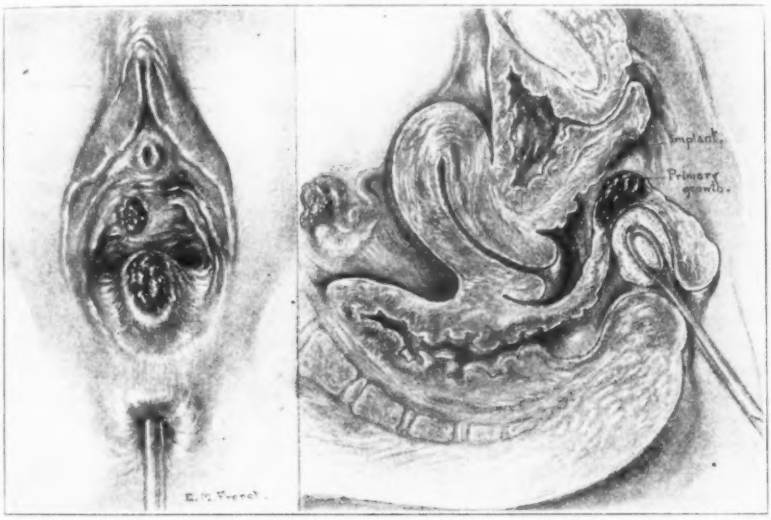

Fig. 4.—Sarcoma of rectovaginal wall, with implant on anterior vaginal wall.

In reference to the apparent confusion in interpretation of the histologic findings I would say that upon careful consideration this is not surprising. Lynch states that the degree of malignancy or benignancy of these growths cannot be judged from their histology alone and that an absolute histologic classification is impossible.

71 HALSEY STREET.

FIBROMYOMATA OF THE CERVIX—CASE REPORT

By Philip J. Reel, M.D., F.A.C.S., Columbus, Ohio

(From The Department of Gynecology and Pathology, The College of Medicine, The Ohio State University)

WHILE fibroids of the cervix are more serious than those of the uterine body, fortunately they are much more rarely found. Their relation to and importance in obstetrics cannot but be appreciated since it is rarely if ever possible to obtain dilatation of the canal equal to that required for delivery.

Because of the unusual size of the tumor and a rather interesting clinical history the following case is reported: The patient was a young white girl, aged 25 years, whose chief complaint, when she first came for examination, was enlargement of the abdomen associated with uterine bleeding. During the preceding seven or eight months she had been conscious of a slow, progressive enlargement of the abdomen so that at the time of examination her appearance was not unlike that of a pregnancy at term. Until two weeks prior to her admission into the hospital she had suffered no inconvenience other than slight constipation and occasional distress from hemmorhoids. At this time, while attempting to carry a heavy suitcase she suddenly developed a severe hemorrhage which necessitated immediate medical attention. Examination at this time revealed the presence and character of the tumor; the patient, however, refused operation until she could be removed to her home city.

The menstrual history was entirely negative except for the hemorrhage mentioned above. There had been no pregnancies. Her past and family history were likewise negative except that the mother had been operated some years previously for a uterine fibroid.

Upon physical examination the abdomen presented a symmetric enlargement about the size and general contour of a full term pregnancy. The upper margin of the tumor was rounded and dome-like, extending to within a finger's breadth of the ensiform. Palpation revealed the mass to be solid and smooth in outline except for a small nodular protuberance the size of an egg located on the upper margin and to the left of the midline. The anterior abdominal wall, although somewhat tense, was freely moveable over the mass.

Pelvic examination showed that the vaginal orifice was very small and the vagina admitted the introduction of but one finger for a distance of 2 cm. A complete effacement of the cervix was found. A large, hard tumor was impacted in the vagina and apparently filled the entire bony pelvis extending upwards into the abdomen to within a very short distance of the ensiform. The mass was so solidly impacted within the bony pelvis that it was impossible to move any portion of it. Rectal examination showed the growth occupying all of the hollow of the sacrum.

At operation the uterus was found extending well above the umbilicus. Enormously dilated veins were present in both broad ligaments. The body and fundus of the uterus were located on the upper margin of the growth a small distance to the left of the midline. Here also were encountered the tubes and ovaries practically normal in size and position in so far as their relation to the fundus was concerned. The operative removal was unusually difficult because of dense adhesions between the fibroid and the rectum and the impaction within the bony pelvis.

The pathologic report showed the tumor to be a true fibroid of the posterior portion of the cervix weighing 7 kg. The external os was found to be flush with the rounded lower surface of the mass while the cervical canal extending from the external os to the base of the uterine body measures 20 cm., the uterine canal being but 1.5 cm. in length. Gross section revealed the typical structure of fibromyomata while the microscopic examination showed a rather marked cellularity.

Fibromyomata of the cervix while not exceedingly rare are sufficiently infrequent to comprise an interesting group of tumors. A careful routine examination of all removed uteri would tend to place their percentage of occurrence at about 6 per cent. They may arise in any portion of the cervix although the posterior lip would seem to be the most frequent site of origin. The genitourinary tract may present important complications when these tumors are of considerable size, especially if they extend anteriorly or laterally within the pelvis. The removal of the tumor which has impaired ureteral drainage may result in a sudden release of back pressure within the kidney and the production of an acute postoperative suppression, the seriousness of which may deter the convalescence of the patient.

MEDICAL ARTS BUILDING.

Rudaux and Durante: A Gravid Uterus Without Apparent Adnexa. Bulletin de la Soc. d' Obstétrique et de Gynécologie, 1925, xiv, 639.

A gravida ii, aged 32, was admitted to the hospital because of eclampsia and died the same day. She had previously had a miscarriage at six months. Autopsy showed an apparently normal uterus but there seemed to be a complete absence of the adnexa and broad ligaments. An abdominal scar was present. Inquiry revealed that an operation had been performed four years previously for an ectopic pregnancy on the right side. The surgeon who operated said that he had removed the right tube and perhaps part of the right ovary but he did not touch the adnexa on the left side. A second operation was performed two years later for a left-sided inguinal hernia.

Only on histologic examination was an ovary found. This was atrophic and contained a corpus luteum. This ovary and the accompanying atrophied tube were buried in the uterine wall on the left side of the uterus. No follicles were seen in the ovary. The authors believe that the condition of the tube and ovary found was not accidental but a congenital anomaly. It is possible that the ectopic pregnancy for which the patient was operated upon, may have occurred in a similarly anomalous tube. The above case indicates that in cases where both ovaries seem to be missing on macroscopic examination no definite conclusion should be drawn until after histologic investigation.

J. P. GREENHILL.

Department of Maternal Welfare

CONDUCTED BY FRED L. ADAIR, M.D.

A MATERNITY HUT IN THE NEAR EAST

(From the Society for Near East Relief)

OUTSIDE the city of Beirut there are camps of Armenians, refugees from Asia Minor, who have been given hospitality in Syria for several years. Their dwellings are often ingenious, as witness several sheathed with flattened gasoline tins, but are very crude. A club of American and British women cooperates with the city in welfare work; Near East Relief maintains a clinic for the refugees and a Day Nursery where the mothers leave their small children while they go out to earn for their little brood.

Armenian refugee mothers with their babies born at the Near East Relief Maternity House, Beirut, Syria. Dr. Wilson Dodd, Medical Director, stands at the left center beside Miss Agnes Evon, Director of Nursing Service. The other doctors and nurses are native Armenians.

Naturally life is a bitter struggle for these unfortunates, bereft of homes and property, doing their best in a strange land to contend with problems of housing and unemployment. One of the most serious of their difficulties has been the absence of any opportunity for maternity care. In the hour of their darkest need these poor women had only their neighbors and friends to help them.

The situation was a source of anxiety to Agnes Evon, the American head of the Near East Relief Nursing Service. With Dr. Wilson Dodd, Princeton, 1916, in charge of the Medical Service, she believed that the doctors and nurses, who were all eager to help, might shoulder the extra burden of the maternity work if it could be concentrated. Concentration meant the building of a hospital adjoining the Near East Relief Clinic and Day Nursery, but there was no money with which to do it.

Yet it was done. The American and British resident women raised the needed funds, and a hut twenty-two feet by forty-five feet was erected. It is of the simplest type, yet its equipment is sufficient, and the babies, dozing and gurgling in their market baskets, are as content as if they were cradled in expensive bassinettes. It has but fourteen beds, but they are enough for each has three patients a month. Its decorations are confined to the beauty of cleanliness and to the freshness of blue and white curtains at the windows.

Already this hospital has proved a superlative blessing. No one who can pay for medical or nursing service is admitted. It reaches the poorest of the poor with its timely and comforting aid.

Support comes from a local charitable society, from the American and British women's club, and from Near East Relief (which contributes the medical and nursing service). It is to continue this and similar work, as well as that for orphan children, that the National Golden Rule Committee asks for donations on Golden Rule Sunday, the first Sunday in December.

MEETING OF THE JOINT COMMITTEE ON MATERNAL WELFARE

A MEETING of the Joint Committee on Maternal Welfare was held in Washington, D. C., on May 18, 1927, Drs. Lynch, Speidel and Kosmak being in attendance. The report of the Chairman of the Committee, Dr. Fred L. Adair, whose absence was due to illness, was considered, and the following recommendations were acted upon: The advisability of holding two meetings annually was favored. Until a more definite financial plan could be worked out it was resolved to continue the requests for the usual appropriations from the participating societies.

The appointment of the chairmen of the subcommittees for each state was to be continued as offering the most favorable method of extending the work of the central committee.

A report on intrapartum care, prepared by Dr. W. C. Danforth, was to be referred to the constituent members of the Committee for study and suggestions.

A resolution was introduced at the Section meeting of the American Medical Association providing for an investigation of the maternal mortality from puerperal sepsis in the United States. Further action on this resolution will be referred to in a later report.

It is a pleasure to record that the Section on Obstetrics and Gynecology of the American Medical Association acted favorably on the suggestion to appoint three of its members to the central committee on Maternal Welfare. The latter is now constituted as follows:

American Medical Association, Section Obstetrics, Gynecology and Abdominal Surgery, Dr. Rudolph W. Holmes, Dr. Robert D. Mussey, and Dr. Fred L. Adair.

American Gynecological Society, Dr. Geo. W. Kosmak, Dr. Frank W. Lynch, and Dr. W. C. Danforth.

American Association Obstetricians, Gynecologists and Abdominal Surgeons, Dr. Edgar A. Vander Veer, Dr. Geo. Van Amber Brown, and Dr. Geo. C. Mosher.

American Child Health Association, Dr. Robert L. DeNormandie, Dr. Ralph W. Lobenstine, and Dr. Fred L. Adair, with Dr. Fred L. Adair, of Minneapolis, Minn., as Chairman of the Joint Committee.

Society Transactions

NEW YORK OBSTETRICAL SOCIETY

MEETING OF JANUARY 11, 1927

DR. W. P. CONWAY reported a case of **Ruptured Ectopic Gestation and Incomplete Abortion.**

This patient, E. M., Italian, thirty-three years old, married, para-seven, was admitted to the Gynecological Ward in the Atlantic City Hospital, on October 13, 1926, with a diagnosis of incomplete abortion, six to eight weeks, and a tender mass in the lower right quadrant of the abdomen. Her last menstruation was August 2 to 8, quite normal, and with no more pain than usual. The first week in September she noticed some spotting for two days, but no regular menstruation. From that time on she had a feeling of soreness and pain in the lower right side daily, and for two weeks before admission to the hospital she was in bed on account of this pain. Her physician at that time made a diagnosis of pelvic inflammation with right-sided salpingitis and a pregnancy of six weeks. The treatment given was, rest in bed, ice bags to abdomen, low enemas, and opiates in small doses for the relief of pain.

Three days before admission to the hospital, she had an attack of sudden severe pain, in the lower part of the abdomen. The next day she aborted the fetus only. Since she lived about ten miles in the country her family physician packed her vagina to control uterine hemorrhage, before sending her to the hospital.

On admission the findings were those of a six to eight weeks' incomplete abortion, with a portion of the placenta protruding from the cervix. She was acutely tender on the right side of the uterus and a fluctuating mass could be felt in the culdesac. The temperature was 99.4,° pulse 120, respiration 28. A diagnosis of ruptured ectopic gestation, right side was made, and she was ordered for operation promptly as her condition was poor, and she was given 250 c.c. of glucose solution intravenously. The uterus was irrigated with a large dull spoon curette. Several pieces of placenta were removed and the cavity packed with plain gauze. On opening the adbomen, considerable fresh blood and many black clots were found in the culdesac. The middle third of the right tube was ruptured and there was a hematoma of the right ovary. The fetus, about 1½ inches long, was found and there were many fragments of decidous tissue. The right tube and ovary and appendix were removed, and the abdominal wound closed with layer sutures.

The patient made an uneventful recovery, and left the hospital on the sixteenth day after admission, in very good condition.

DISCUSSION

DR. WILLIAM P. HEALY said there were two points worthy of comment from the operative point of view. He did not advise removal of the appendix in the presence of so much free blood in the peritoneal cavity. Also, it is desirable to leave the ovary on the affected side, if reasonably normal, rather than to remove it with the diseased tube. In this particular instance the ovary seemed not to be normal, therefore it was undoubtedly good judgment to remove it. It was undesirable to curette the uterus before opening the abdomen to remove a supposed ectopic gestation because of the possibility of an error in diagnosis. The lesion

may not be an ectopic gestation, but may be a normal intrauterine pregnancy complicated by some other pelvic lesion. Or the condition may be a combination of normal intrauterine pregnancy with ectopic gestation, and it would be unfortunate to terminate a normal intrauterine gestation by curettage.

DR. H. D. FURNISS said that combined uterine and extrauterine pregnancy was rare. Novak (1925) was able to collect from the literature, from 1913 to date, 32 cases, two of them his own. These added to the 244 cases collected by Leugebauer, from 1908 to 1912, gave a total of 276. Dr. John N. Furniss had a case of ruptured ectopic, successfully operated upon, and delivered seven months later of full-term twins.

Recently Dr. Furniss had a patient who was curetted to interrupt what was thought to be a uterine pregnancy. Two weeks later she had a profuse internal hemorrhage as a result of a ruptured ectopic, and was operated upon eight hours later. She had all the appearances of a postoperative hemorrhage, and after blood transfusion he reopened her to find a quart of free blood, the hemorrhage being due to loosening of a ligature at the uterine end of the removed tube. She made an uneventful recovery. He doubted a uterine pregnancy.

DR. CONWAY said in reply to Dr. Healy that on arrival of the patient at the hospital the fetus was out. He emptied the uterus of the placenta and then did the laparotomy for the ruptured tubal pregnancy.

DR. O. A. GORDON, JR., reported a case of **Sarcoma of the Rectovaginal Septum.** (See page 382.)

DR. R. N. PIERSON presented (by invitation) a paper entitled **Fibromyomata and Pregnancy.** (For original article see page 333.)

DISCUSSION

DR. I. C. RUBIN said with reference to the incidence of myomata in sterility, that if some statistic study, comparative in character, should be made, and based on such a large study as Dr. Pierson has presented, it would help us to formulate definite ideas as to the best way to treat this complication.

This might be made to include: (1) cases of sterility associated with fibroids, no operation having been performed; (2) cases of sterility, or pregnancy complicated by fibroids which have been removed by myomectomy; (3) cases of myomectomy done during pregnancy where, (a) either abortion took place or, (b) the pregnancy went on to term.

The reason for such a statistic study is what Dr. Healy has emphasized, and that is that sterility is very common in women who have fibromyomata. Pregnancy may take place in these cases not only during the early reproductive life, but rather late, and at the premenopause in some instances. The first pregnancy very commonly terminates in abortion; the second probably too. The question arises whether we shall in a second pregnancy in a woman who has had a previous abortion, probably due to the fibroid condition of the uterus, do everything in our power to carry her to term, even to the extent of keeping her in bed for three or four months, and then meeting the situation as it might arise during labor, by trial, etc.; or whether we shall let her have her abortion the second time, and then subsequently do a myomectomy in the nonpregnant condition.

It has been Dr. Rubin's practice in the effort to help these women, to give them every chance and not risk doing myomectomy when there is slight bleeding because of the possibility to terminating that very early pregnancy which might have gone on to term and which might have given her the only chance of becoming a mother.

DR. JOHN O. POLAK called attention to the two or three instances of meddling with labor in the presence of fibroids by the introduction of a bag. There is no more pernicious practice than the introduction of a bag for dilatation of the cervix in fibroid uteri. We usually have an inertia in these cases due to a bad uterine wall with potential sepsis owing to defective drainage. We can prevent abortion in a large number of these women if we teach them how to behave during pregnancy. The tendency to abortion is much more frequent when fibroids complicate pregnancy than in normal pregnancy. These patients should be taught to rest at the time of the expected period and to abstain from sexual relations until the pregnancy has passed the fourth month, and to take the knee chest position night and morning for a period of ten minutes. By assuming this posture incarceration of the heavy uterus is prevented and pelvic engorgement relieved.

Dr. Polak believed a large number of these pregnant women with fibroids will take care of themselves during labor, and he lets these women go to term, and gives them a test of labor. If they do not deliver spontaneously (and they usually deliver promptly if they are going to deliver spontaneously) he does a cesarean which is followed by hysterectomy. These uteri contract and retract poorly and uterine drainage is interfered with which results in morbidity or mortality. Six or eight years ago he had several cases in succession in which conservatism was attempted. They all drained badly and two of them died from infection.

DR. A. B. DAVIS called attention to pedunculated myofibroma of the uterus, with or without torsion of the pedicle, as a complication of pregnancy. In 1925, a primiparous patient came under his care when she was three months pregnant. Nausea and vomiting were troublesome symptoms which continued to some extent throughout the pregnancy. There was a report that when two months pregnant she had a short sharp attack of bleeding which ceased.

Upon first examination normal uterine pregnancy was found, and also a rather freely movable mass to the left side of the uterus. A diagnosis of pedunculated fibroid was made, taking its origin to the left, anterior and somewhat below the fundus, with rather a long pedicle. It was decided to manage this case expectantly. From time to time there were reports of sudden cramp-like pains in this region, lasting for a short time and as suddenly disappearing; also, occasionally, slight spotting appeared. There was nothing noteworthy in the blood pressure, transitory glycosuria was noted from time to time. Pregnancy continued in this way until the end of the sixth month when the patient suffered very severe pain in the region of the tumor. Morphine was given freely, affording only partial relief. The patient was then admitted to the hospital with the appearance of being very ill and suffering acutely. Temperature 101° F., pulse 120 and very high leucocyte and polymorph count. There was well-marked albuminuria with hyaline and granular casts. Marked tenderness was evident over the site of the tumor and for a considerable area about it. There were no uterine contractions or disturbances in the fetal heart.

The abdomen was opened disclosing a tumor mass, evidently strangulated, about 7 cm. in diameter; two-thirds of its surface was covered with adherent omentum and plastic lymph, a portion of the small intestine was also adherent. These adhesions were easily separated, the pedicle was found tightly twisted one and one-half turns. This was clamped and ligated and the tumor excised. Peritoneum was sutured over the stump and the abdomen closed in layers. Postoperative course was febrile and painful for a few days and thereafter uneventful. There was no attempt at onset of labor and the pregnancy continued to full term when a living child, vertex R.O.P. was delivered by easy low forceps.

Another case of normal uterine pregnancy with a very large pedunculated fibroid: In this instance the pedicle was short, about 5 cm. in diameter, taking origin to the right posterior and just below the fundus. Beyond discomfort and pressure

this gave no trouble until early in the seventh month. At this time it was so large that great distress was caused by pressure, especially in the region of the liver. The tumor was removed and the stump treated as in the former case. It proved to be larger than the then pregnant uterus. Characteristic red degeneration was well advanced. Recovery from operation was uneventful and the pregnancy continued to full term.

It is rather surprising how many cases we see of even very large fibroids of the uterus as complications of pregnancy and to note how well the developing uterus will adjust itself to this encroaching mass, especially if the abdomen is large and roomy. It is noteworthy that these tumors diminish in size after labor. Sometimes interstitial fibroids of comparatively small size proved to be the offending agents, causing threat to abort. Many times these can be removed by myomectomy and the pregnancy continue. Dr. Davis was not successful in having pregnancy continue in cases of myomectomy in which a considerable area of membrane has been exposed, for within a very short time the patient aborts, or goes into premature labor. He had many fibroids of the uterus complicating pregnancy in patients upon whom he had performed cesarean section but did not recall that he had ever done a hysterectomy or lost a patient in such cases.

DR. ELIOT BISHOP said that treatment depends on the location of the fibroid. That which seems the most serious is the large *obstructing tumor*, which, grave as it is, suggests its own treatment,—delivery from above. The second location of the tumor is much more common than we would infer from the paper, because, presumably, in most instances, it is inconsequential, and that is the *subserous* tumor, which in some instances causes pain so severe as to need very definite treatment and, in very rare instances, to become necrotic, as Dr. Kosmak reported at a meeting of the State Society a few years ago.

The next location is *intramural*, and here the tumor produces trouble by interfering with that part of the physiology of labor that is insufficiently emphasized—retraction. If the tumor is in the lower uterine segment, retraction is delayed, or often prevented, the first stage refuses to proceed, and section is imperative. If, however, the delivery is accomplished spontaneously, contraction and retraction in the third stage may be interfered with to the extent of a postpartum hemorrhage. Later on, the physiology of the puerperium may be faulty, and subinvolution, with its train of symptoms, develops.

DR. GEORGE W. KOSMAK said that a study of this kind, involving such a large number of cases so closely observed by a single body of men, will undoubtedly be quoted repeatedly in medical literature, because it constitutes a most valuable contribution to the subject. He took exception to the attitude toward myomectomy during pregnancy and believed that fibroids should be regarded more seriously before and after labor than during labor.

Dr. Kosmak referred to a case reported before this Society some years ago, in which myomectomy during pregnancy saved the woman, saved her uterus, and allowed another pregnancy to take place subsequently. This patient was about five months pregnant and her uterine mass reached to the ensiform. She was bleeding slightly, she had a little elevation of temperature and a great deal of abdominal pain. She was in such condition that something had to be done to relieve her. Dr. Kosmak did an exploratory laparotomy, expecting to do a hysterectomy, and found one fibroid in the anterior wall at the fundus, one at one cornu, and another one on the posterior wall, far down, so that this lowermost fibroid really occupied almost the entire pelvic cavity. There was no difficulty in removing the fibroid in the anterior wall and that near the cornu, but it required complete delivery of the uterus outside the abdominal cavity to get at the fibroid on the posterior wall, and this extended down practically to the endometrium.

The three tumors were excised, she went on with her pregnancy and was subsequently delivered. This case was at the Lying-In Hospital. Before that in another case a fibroid as large as a good-sized grapefruit was removed from the fundus of the uterus, near the cornu, which was also accompanied by slight elevation of temperature and extreme pain. She went on to term and was delivered without any difficulty. The first patient was delivered a second time less than two years ago without difficulty whatsoever.

Dr. Kosmak believed if fibroids cause symptoms during pregnancy, including pain and tenderness, slight elevation of temperature, and perhaps bleeding, that we should in all such cases attempt a myomectomy. If after the abdomen is opened, we find conditions are such that it might be more advisable to terminate the pregnancy, we can always do so; but a great many of these women can have their uteri saved for a possible future pregnancy if we pursue this more conservative course.

As to the fibroids after delivery, Dr. Kosmak believed that we are confronted with a more serious situation. In those cases a conservative policy, while it seems to be indicated, is one that cannot always be followed. He had a few cases in which he did a radical operation for sloughing fibroids after labor, with good results. It means if the fibroid is in such a position that you can get at it, it can sometimes be removed without sacrificing the uterus and save the uterus for a future pregnancy, particularly in the young woman. On the other hand, the process may be so extensive that we may have to remove the entire uterus; but his point in making these remarks is to direct attention to the possibility of conservative treatment in the presence of fibroid tumors in which during pregnancy there is a rapid growth and which cause symptoms and where especially in the young woman, we do not want to sacrifice her ability to bear children subsequently.

DR. R. T. FRANK said that the viewpoints so far submitted seemed to have come largely from the obstetricians. He thought that those who see these cases earlier look at them from a slight different standpoint. If asked to determine whether it is safe for those women to go through labor, there is no harder question to answer when such a woman presents herself in the second or third month of pregnancy. Just as Dr. Kosmak has said, and Dr. Bishop, too, when the tumors obstruct the pelvis, the answer is easier to give. In other cases it always is advisable to suggest waiting, under close observation, for a month or two and see the rapidity with which these growths increase. We all know they are apt to slow up after the fourth month, but, again and again, by the time the fourth month it reached, the question has answered itself. If by that time the pregnancy occupies one-third of the mass and the fibroid two-thirds, he thinks the likelihood of such a patient carrying to term is extremely small. Furthermore, he thinks the most favorable time for myomectomy, (and in this he agreed with Dr. Kosmak) in many cases should be considered as around the fourth month.

Dr. Frank referred to two striking cases where in doing a myomectomy he saw the fetus shining through the membranes. The endometrium was actually partly injured in the enucleation of the tumors. Both those cases went to term, and one of them has had a second child since then without the slightest trouble. If we find at the fourth month that enucleation of the tumors jeopardizes the likelihood of carrying the fetus to term to such a degree that an immediate abortion is likely to occur, it is perfectly feasible to empty the uterus and then sew it up as if you were dealing with a cesarean section at term, and with the exception of one case, where there was a very advanced thyroid condition present, no fatality occurred in all the cases Dr. Frank treated in that fashion at this early period of pregnancy. On the other hand, if you open the abdomen, particularly

in multiparae, and find the conditions for myomectomy are so unfavorable that the likelihood of carrying through on account of the fibroids occupying a large part of the entire mass is small, Dr. Frank would not hesitate to do a hysterectomy.

DR. S. H. GEIST referred to a primipara in the fourth month of pregnancy (upon whom he had done a myomectomy). She went into labor normally and delivered herself spontaneously of a seven-pound male child. She had a retained placenta and finally it was necessary to remove it manually. He found the placenta perfectly free except along a straight line from fundus half way to cervix. Dr. Geist found that for a distance of seven centimeters in length and one and a half centimeters in width, there was no evidence of placental tissue, but simply a thin shaggy scar where the placenta was attached. In the removal of the fibroid the circulation of the endometrium, or rather the decidua, had been so interfered with that it was replaced by scar tissue, and the condition was practically a placenta accreta.

She had a second baby later without any difficulty with the placenta.

DR. WILLIAM P. HEALY said that pregnancy going to term is unusual in women having fibromyomatous tumors. Therefore, when we come across a patient who is pregnant and who has a fibromyomatous uterus, we should bear in mind that this may be the only pregnancy, especially if it is her first one, that she may ever carry to term, and we ought to approach it very conservatively. If it is in the first four or five months of gestation and the number of tumors is not great, and the location is such, as in the case mentioned by Dr. Ward where there is an incarcerated, retroverted or retroflexed uterus with a tumor lying anteriorly, the woman is going to abort if you do not do something to get the uterus out of its malposition, and that means removing the tumor, and you may save the pregnancy for her. He considered it better to do the myomectomy in the presence of the pregnancy and take the risk of a possible subsequent spontaneous abortion, rather than to interrupt the pregnancy with the idea of doing a myomectomy later and hoping that then she will conceive and go to term. On the other hand, if you have a large number of myomata in the uterus, it is infinitely better to leave the patient alone with her pregnancy, because, as has been mentioned by the reader of the paper and by Dr. Polak and most of the speakers, we are constantly amazed to note how apparently impossible conditions are overcome spontaneously in the normal growth of the uterus with the pregnancy.

DR. PIERSON (closing): Dr. Polak spoke of the use of the bag as being practically never indicated for the reason of fibroids alone. We had eight cases in this series of 250 in which a bag was used, but only one case in which it was used because of the fibroids. In that case, it was ineffective.

As for the viewpoints of Dr. Kosmak, Dr. Frank, and Dr. Ward in respect to myomectomy during pregnancy. Dr. Pierson agreed that there are cases in which myomectomy may be properly done, but that conservative treatment is wiser in the majority of cases, for the reason as mentioned by Dr. Healy and Dr. Rubin that it may be the patient's last chance to have a child. For experience shows that, many times, the attempt at conservative myomectomy during pregnancy has to be abandoned because of difficulties arising during the procedure, so that finally hysterectomy is done.

Dr. Geist's report of a case in which the placenta was adherent to a former myomectomy scar is interesting. There were 15 cases of adherent placentas in this series of 250. This is, however, a clinical and not a pathologic diagnosis. It is probable that only a few of these cases were true adherent placentas.

Dr. Rubin spoke of the relationship of fibroids to sterility. No report was here included of the cases upon which myomectomy was done as a treatment of sterility. Dr. Rubin spoke also of the time of election for doing myomectomy

from the standpoint of improvement of errors of reproductive capacity. This is a very important and difficult problem. Dr. Pierson was reminded of a case first seen at about the sixth month of pregnancy with an anterior intramural fibroid about 5 cm. in diameter. This patient aborted at six and one-half months. With involution of the uterus the tumor disappeared. The patient, in a few months, wanted to know if she should again become pregnant. The late Dr. Studdiford agreed that since no tumor was palpable, she should be allowed to become pregnant. Pregnancy occurred promptly and the fibroid reappeared at about the fourth month. At five and one-half months, she again had an irritable uterus and threatened premature labor. The patient was put to bed for the rest of her pregnancy. Even so, there was premature rupture of the membranes at the eighth month. Fortunately, her five-pound child survived. Such an experience makes one wonder if one would be justified in such a case in doing a myomectomy in the puerperal period, or shortly thereafter, in order to improve the patient's future reproductive capacity. The tumor just described has again involuted with the uterus, so that it cannot now be felt.

OBSTETRICAL SOCIETY OF PHILADELPHIA

STATED MEETING, DECEMBER 2, 1926

DR. B. P. WATSON, of New York, by invitation, presented an address entitled **The Responsibility of the Obstetrical Teacher in Relation to Maternal Mortality and Morbidity.** (See page 277.)

DISCUSSION

DR. RICHARD C. NORRIS said that it seemed in this country, in recent years, that better results are obtained by increasing more and more our hospital maternity work. We are urging more and more women to go to hospitals for their confinement for the benefit of the woman herself as well as the practitioner of obstetrics. The trouble with the system of cooperative or teamwork of a specially trained nurse and a doctor, in remote districts, is that the work, practically, would largely fall to the associated trained obstetric nurse. I am not sure that our Public Health Service, which is demanding more and more the services of the trained nurse as a substitute for the rapidly decreasing country doctor, is not making the public service nurse a higher type of midwife. The midwife problem we have tried to get rid of but find, practically, we cannot do it. If the country doctor cannot be a trained obstetrician, which seems to be a fact, this work must fall into the hands of women properly trained for it, whether you call her a trained obstetric attendant or a higher order of midwife. It is impossible to have the doctor in the outlying districts in attendance on two or more women actively in labor at remote distances from each other. The more practical plan is to increase everywhere community maternity hospitals, even in outlying districts. To educate a group of graduate nurses as obstetric attendants, and attempt to have them cooperate with country doctors, would ultimately lead to the nurse replacing the doctor, if they exhibited, as they probably would, the self assurance and attitude of the modern trained nurse. He should prefer the slogan of "more obstetric hospitals" rather than "more trained nurses to do the doctor's work."

DR. L. S. COGILL wondered what effect—in the near future—periodic health examinations are going to have upon these statistics.

If we do follow-up work during the entire so-called childbearing period of the woman instead of merely during the prenatal stage, we can check up much earlier any existing pathology, which otherwise would result in ill health or death of mother or infant.

If the infant is followed through health clinics from birth to motherhood, much needless pathology will be avoided.

This plan properly carried out, plus good care at birth should tend toward reduction of the present maternal and infant morbidity and mortality.

DR. P. BROOKE BLAND said that Dr. Watson's paper has placed the stamp of approval on the teaching of obstetrics in Philadelphia institutions and the plan he has outlined is being followed today. The mind of the medical student, the prospective general practitioner of medicine, who must of necessity be 33 per cent obstetrician, must be inculcated with the well-known truth that the successful practice of obstetrics resides, first, in zealous prenatal supervision, so aptly described or named by Holland, "The Strategy of Obstetrics," and, second, in pursuing during labor an aseptic watchful waiting plan, as mentioned by Dr. Watson. Hasty manual or indiscriminate instrumental and abdominal delivery have combined to contribute to the unusual or the exceptionally high mortality and morbidity in this country. To all familiar with the present situation it is quite obvious that something is woefully wrong in our obstetric work and it is equally obvious that something must be done, some plan inaugurated, to reduce or eliminate the present day high morbidity and mortality.

DR. GEORGE M. BOYD was impressed with the conservative viewpoint taken throughout this address and was fully in accord with his counsel as to the wisdom of testing the stages of labor, keeping in mind the fact that the primipara may go 24 hours and the multipara 12 hours without developing dystocia. In 1921 he reviewed 10,642 consecutive cases delivered in the Philadelphia Lying-In Charity. This report was prompted by the feeling that many obstetricians exercised too great haste in labor and too often resorted to surgical interference. The report was made to determine the frequency of spontaneous delivery and also the maternal and fetal mortality. It was found that if the time element was observed, in 90 per cent of the cases the labor was spontaneous and that surgical interference was reduced to the minimum. By following this course there was a fetal mortality of 5.39 per cent. A study of 10,000 cases in 1915 made by the Sloane Hospital for Women, New York, the Columbia Hospital, Washington and Johns Hopkins Hospital, Baltimore, showed about the same fetal mortality.

DR. WILLIAM R. NICHOLSON felt that it would be not an unmixed evil if men were sent out from the various medical schools of the country without any knowledge of the so-called "high application of the forceps." The indication for this operation is very rare, and most of the cases subjected to it either should have been cesareanized or should have waited for a longer test of labor.

It is impossible to teach the differential diagnosis between these two classes of cases to a man in his undergraduate course, and it is also impossible to teach these to a short term interne.

He thoroughly agreed also that too little time is given to the teaching of obstetrics in the medical schools today and was convinced that much of the time spent on the benches or assisting at gynecologic and obstetric operations, is pure, sheer waste, and that if the time now devoted to this useless activity were devoted to the actual study of prenatal cases, together with the use of the mid-pelvic and low forceps, that the student would benefit, to say nothing of the added safety to his patients.

With regard to the question of the midwives, there is, of course, in this country, not the least danger that the better class of patients will ever be in the hands

of the midwife, and no nation, as yet, has ever been able to get away from the midwife, and the trend on the Continent and in England, has been to improve the knowledge of the midwife, in order that she may care for her patients with less danger.

It is not the time nor place to quote midwife statistics, but the Pennsylvania mortality and morbidity percentage compared very favorably with those furnished by a similar collection of cases delivered outside hospitals.

The plan of inspecting each case after delivery is the only feasible plan to insure good care and the expense incurring in this plan is very much less to the state than it would be if these women were all hospitalized.

DR. WATSON (in closing) said that in Edinburgh the clinical material in hospitals was being used almost entirely for the midwife to the exclusion of the medical student, and one of the first addresses he gave in Edinburgh was a protest against the midwife. In the four years he was there, he changed his opinion because he found that the properly trained midwife was filling a place in the community. In the large working communities in Britain where men earn a bare living wage, where both doctor and nurse cannot be paid, where there is not sufficient hospital accommodation to provide for every confinement, the midwife does good work. She would do still better work if she always cooperated with the doctor. Dr. Watson was very much struck with the enthusiasm of certain busy practitioners in mining areas and manufacturing towns who had employed in their practice trained midwives. The doctor exercised prenatal supervision; the midwife did the actual delivery, only calling in the doctor when necessary. The number of instrumental deliveries was greatly reduced and the doctor himself had more leisure. Dr. Watson quite agreed with Dr. Norris that to have sufficient hospitals to accommodate every woman in labor would be the ideal solution of the problem. That is going to take some time and we must be feeling out in all directions to meet the present situation. In regard to teaching students, we must get back to essentials, we must teach clinically. Students must know biochemistry and metabolism and the various laboratory tests, but don't let us have them depend on these things to the exclusion of simple clinical tests. I believe that we must go back more and more to the old method of making them listen, inspect, palpate, auscultate, and make up their minds about the whole clinical picture, using laboratory methods to fill in the blanks and complete the diagnosis.

NEW ORLEANS GYNECOLOGICAL AND OBSTETRICAL SOCIETY

MEETING HELD FEBRUARY 10, 1927

DR. A. F. HEBERT reported a case of **Emphysema Following Labor.**

The patient, a white woman, was admitted in hard labor and was delivered spontaneously shortly thereafter. About an hour and a half after delivery, and some three-quarters of an hour after she had begun to complain of pain and swelling in the left side of her neck, she was examined by Dr. Hebert, who made out a distinct area of emphysema in this region. The process continued to spread along the line of the sternomastoid muscles and under the pectorals, down to the tip of the sternum. On the day the report was made it extended as far as the elbow. X-ray examination was negative, her general condition seemed good, and recovery was expected.

Dr. Hebert had seen no similar case before, and on inquiry found that Dr. C. Jeff Miller had seen but two and Dr. J. W. Newman but one. He had not investigated the literature, but mentioned that DeLee ignored the condition in his textbook. The interesting feature of the case was its occurrence so soon after a normal labor, with no explanation of the etiology.

DR. HILLIARD E. MILLER recollected that two years ago a case similar to this in the area involved was reported in *Surgery, Gynecology and Obstetrics*. The author believed that he was reporting a unique condition, but the following month the editor of this Journal (G. W. K.) called his attention to some forty similar cases in the literature, and gave a full list of references.

DR. T. B. SELLERS reported a similar case treated by him five years ago. The patient, a primipara, developed the condition during the time she was in hospital undergoing treatment for pernicious vomiting, of so severe a type that it finally responded only to repeated intravenous infusions of glucose. She was originally a very large woman, and the emphysema, which involved the head, neck and chest, distorted her almost beyond recognition. The condition cleared up spontaneously within a few days, but two and a half months later she miscarried for no apparent reason.

DR. B. C. GARRETT read a paper entitled **The Evolution of the Low Cesarean Operation,** condensed from DeLee's paper before the American Gynecological Society in 1925.

DISCUSSION

DR. PHILLIPS J. CARTER stated that he had performed this operation first in five cases on the service of Dr. C. Jeff Miller in Charity Hospital from 1915 to 1917. All of the patients had been examined on the outside, in two cases forceps had been attempted, and all of them in his opinion were definitely infected. Drainage was done in all cases, in all the convalescence was definitely febrile, but in spite of the unfavorable circumstances, only one patient died, of a low grade peritontitis. He believed that it should be emphasized that even the present type of operation is intraperitoneal, though the suturing of the flaps of peritoneum to the parietes makes it more definitely extraperitoneal than any of its predecessors. He emphasized the fact that it was important to make the uterine incision long enough to permit extraction of the head without difficulty after forceps had been applied, since otherwise an uncontrolled tear with severe hemorrhage might result.

DR. B. C. GARRETT, in closing, stated that within the last year he had used mercurochrome in the preparation of all his obstetric cases, as well as his vaginal surgical cases, but that the change from the former preparation with alcohol had been too recent for him to state comparative results. He doubted the value of morphia before operative delivery, at least from the standpoint of the child, and cited one case of his own in which the child was nearly lost as a result of the administration of this opiate immediately before delivery. He also doubted the value of iodoform gauze within the uterus, and cited a personal case in which, in spite of the routine washing of the iodoform gauze, as was his custom, the patient had had an extreme elevation of temperature over a period of several days, which could only be attributed to too much iodoform. In his opinion the best way to stop uterine bleeding after cesarean section was to close the uterus promptly, and then rely upon pituitrin and ergot. The repeated cesarean operation presented no difficulties when this technic was employed, he had personally em-

ployed it three times on the same patient, and believed he would probably have to use it again in her case, since, in spite of his advice, she had refused sterilization at the last operation.

DR. LUCIAN A. LEDOUX reported a case of **Postoperative Rupture of the Uterus After Cesarean Section.**

Lillian S., aged 19, primipara, was admitted to the New Orleans Charity Hospital April 13, 1922, and died there April 26. When first seen she had been in labor about two hours. The general physical examination was negative. The pelvis was of the generally contracted type, and a marked disproportion was present. The fetus, which was in the L.O.A. position, was alive, the heart rate being 140. The cervix was soft and one finger dilated. Nine hours after admission, when further cervical dilatation had been secured by fairly good, though by no means continuous uterine contractions, cesarean section was done under ether anesthesia by the classical technic, after the vagina and cervix had been thoroughly iodinized. The child was delivered alive and in good condition, one c.c. of pituitrin was administered prior to incision of the uterus, and the uterus was closed in three separate layers by continuous chromic No. 2 sutures, the fascia and peritoneum were closed with the same suture material, and the skin was closed with silkworm sutures. Drainage was not indicated. It might be added that the uterus was well contracted when abdominal closure was begun.

The patient reacted well from the operation and her convalescence was entirely satisfactory for several days; the temperature ranged from 99° to 101,° and the pulse from 70 to 92. There was an occasional complaint of low abdominal pain. The lochia were normal in amount, color and odor, and the abdominal wound, when dressed, seemed in good condition.

April 21 the temperature rose suddenly to 104° and the pulse to 118, accompanied by severe abdominal pain, marked distention, and nausea and vomiting. The lochial discharge continued normal in color and amount, but the odor was now very foul. Her condition grew progressively worse until her death April 26, on the twelfth postoperative day.

The cause of death was evidently puerperal sepsis and general peritonitis, the origin of which was revealed by the autopsy performed by Dr. Rigney D'Aunoy through the abdominal incision, which inspection revealed to be in satisfactory condition, complete union having occurred.

The final diagnosis read general peritontitis secondary to postoperative rupture of the uterus, acute nephritis and focal necrosis of the liver.

DISCUSSION

DR. LEDOUX added from his own observations made at autopsy that the edges of the uterine rupture were definitely gangrenous and the amount of catgut remaining was small. The rupture included the entire length of the original incision and was quite irregular. The serous surface of the uterus appeared fairly normal. The whole picture was one of intrauterine infection, ascending in character.

DR. E. L. KING said that possibly many similar cases passed unrecognized, although he personally knew of none in which the uterine rupture had occurred so soon after operation. In discussing suture material and methods of suturing the uterus, he said that while most surgeons used continuous sutures, it must be remembered that with the process of involution the original uterine incision was considerably smaller at the end of eight or ten days, and therefore the sutures would not hold as tightly then as if the incision remained the original length. Some authorities advocate interrupted sutures, believing that if one breaks, the others will hold.

DR. C. JEFF MILLER questioned the wisdom of calling this particular case a rupture of the uterus; to him it seemed simply an evidence of postoperative infection, with results similar to those which would follow such an infection elsewhere. He believed that the method of suturing the uterus had nothing to do with the results, since it seemed hardly conceivable that any surgeon could have been responsible by an error in technic for the failure of three lines of sutures to hold.

DR. LEDOUX, in closing, said that it was now his custom to use interrupted sutures for the middle line, but that if infection were present he did not believe this would materially alter the results. The interesting feature in this particular case was the inclusion of the entire uterine wound in the infection, plus the fact that the rupture occurred on the eighth day, after an apparently satisfactory convalescence.

DR. URBAN MAES (by invitation) read a paper entitled **The Differential Diagnosis of Right-Sided Abdominal Pain.** (See page 364.)

DISCUSSION

DR. E. L. KING stated that he had seen recently three operations performed in girls of twelve or thirteen years on a diagnosis of acute appendicitis, perfectly justifiable in view of the history and physical findings, in each of whom operation disclosed an ovarian cyst with twisted pedicle, a condition which could not have been suspected beforehand unless rectal examination, which did not seem warranted, had been made. In those cases in which rupture of the tube occurred into the peritoneal cavity, the syndrome was usually so definite that diagnosis presented few difficulties. He recalled one case he had seen some years ago in Paris, in which the patient was curetted on a diagnosis of uterine abortion, and preparations were made to perform hysterectomy, according to the French custom in puerperal infection, when her temperature rose to 100° shortly thereafter, but when laparotomy was done, a tubal abortion was revealed; a postoperative review of the history made the diagnosis perfectly clear. Vaginal examination was not always helpful, particularly in the obese patient, with the tubal mass small. In one instance he had been so uncertain of the diagnosis that he was obliged to curette the uterus and have the scrapings examined for chorionic villi before he could decide that a uterine abortion and not a tubal pregnancy was present. He had personally never seen the bluish discoloration about the umbilicus, mentioned by Cullen as a diagnostic sign, nor had he seen the shoulder pain mentioned by some French writer as indicating extensive hemorrhage after tubal rupture.

DR. HILLIARD E. MILLER said that he had personally within the last two months operated on two women for pus tubes who a few months before had had emergency laparotomies for supposedly acute appendicitis; in each instance no vaginal examination had been made, and the appendix was removed through a McBurney incision, without exploration of the pelvic contents. He recently had removed an apparently normal appendix in a child of three in whom the history and physical findings were typical of acute appendicitis, when all other conditions, including chest pathology, had been eliminated, as he was assured by the pediatrician who called him in consultation. He believed that if an x-ray had been made before operation it would have revealed the pneumonia which was quite evident the following day.

DR. C. JEFF MILLER believed that Dr. Maes' paper was to be commended because of its excellent balance, in that it emphasized the urgency of these

abdominal conditions, rather than refinements of diagnosis. In his opinion the important point to bear in mind in the management of acute abdominal conditions was that, valuable as laboratory examinations and similar details of diagnosis were ordinarily, they had small place in these conditions in which prompt diagnosis and prompt treatment were the only methods of averting tragedy. In tubal pregnancy he had frequently seen patients profoundly shocked in whom the hemorrhage had been small; personally he had seen Cullen's sign but twice, once in a case of tubal pregnancy, and once in hemorrhage from sarcoma of the intestines. He did not believe it wise to wait for detailed examinations of the blood in such cases. In his experience the most valuable sign of rupture was the presence of generalized tenderness in the vaginal vault, although he was not aware that the average textbook laid any stress upon this point.

DR. MAES, in closing, said that while ureteral stricture and ureteral stone occasionally appeared in the category of acute abdominal conditions, ordinarily preliminary urinalysis would establish the diagnosis; however, he had personally seen three cases in which the abdomen was opened on a diagnosis of acute appendicitis, an apparently normal appendix was removed, and subsequent operation had to be done for a stone in the ureter at the brim of the pelvis. Purposely he had avoided the use of the word shock; in the ordinary acceptation of the term, shock is not present in the early stages of an acute abdominal condition, but collapse sometimes is, especially when hemorrhage is present. He also believed that the presence of the so called abdominal facies was a most important diagnostic aid.

Robinson: Prenatal Care and Puerperal Mortality. The Lancet, 1923, ccv, 649.

The fact that there has been no appreciable reduction in the maternal mortality from childbirth during the last fifty years may be explained on the basis that modern advances in obstetrics are not in general use. In support of this contention the writer gives the causes of death in childbirth and shows the extent to which these morbid processes are associated with recognizable warning symptoms during pregnancy and further that such prodromes are largely amenable to preventive treatment.

He believes that the majority of puerperal fatalities belong to the class of preventable disease, and therefore, that maintenance of the present high puerperal death rate is primarily due to the neglect of the principles and practice of preventive medicine, and only by general adoption of prenatal care can any serious reduction of puerperal mortality be effected. NORMAN F. MILLER.

Füth, H.: Prolongation of the Legal Period of Gestation. Monatsschrift für Geburtshilfe und Gynäkologie, 1923, lxii, 87.

Ruge recently declared that up to the present time there is no unquestionable case on record of a living child having been born after a gestation period of more than 302 days.

Füth reports three cases in which the pregnancies lasted more than 302 days. The minimum periods for these cases were 329, 313, and 308 days. The author agrees with those who maintain that the accepted legal maximum period of gestation should be extended. J. P. GREENHILL.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

THE GYNECOLOGIC LITERATURE OF 1926

BY SYDNEY S. SCHOCHET, M.D., AND JULIUS E. LACKNER, M.D.,
CHICAGO, ILLINOIS

THE year 1926 marks but little advance and progress in gynecology. The purpose of menstruation, the etiology of malignancy, and the many important physiologic processes of the reproductive organs with which we are particularly concerned comprise but a small part of the voluminous literature. The fuller understanding of these problems seems to us to be the goal of gynecology.

The etiology of malignancy remains untouched. Some advances have been made in the physiology of menstruation, but too many functions are attributed to the comparatively unknown ovarian hormones. Real constructive advances have been made in the study of sterility.

Regret as we may, new operative procedures on the uterine ligaments have already fallen far below the ancient standard. The endometrium has also shared in fewer abuses from the curette, except from a few new uterine endoscopes. However, the cervix has received more attention than in previous years. The treatment of endocervicitis with the cautery and other electrical devices is the outstanding topic in the literature of 1926.

GENERAL PROBLEMS

Charitable excuses may be made for additional aids in the diagnosis in gynecology. With the rapid strides in the various medical sciences, biochemic knowledge and refined laboratory technic are rapidly furnishing the gynecologist and specialist with diagnostic methods of precision and indications for treatment, based upon highly technical and refined methods, where but a few years ago common sense methods afforded the sole basis of treatment. We feel compelled to state our belief that much mischief is done to the specialty of gynecology by the addition of these new methods of diagnosis and treatment to the already large equipment necessary for the practice in this branch of medicine.

Thompson[1] advocates transillumination of the cervix as a simple procedure that should be done as a part of the routine of a pelvic examination. Cystic conditions of the cervical glands are said to be detected, which very often are not revealed by ordinary examination. A remarkable fact of interest!

Neuhof and Cohen[2] suggest abdominal puncture as an aid to diagnosis in every acute intraperitoneal lesion for which operation may be indicated. The authors consider this procedure to be a simple, safe, and valuable aid in the diagnosis of acute abdominal disease. This hopeless suggestion does not seem to us to be warranted.

Fuss[3] concludes from his material of 516 cases that the Ruge II and Philipps virulence test furnishes a reliable warning sign of the prognosis in operative cases. A positive test indicates great probability of grave infection.

In a careful study of Philipps' virulence test with vaginal and cervical germs in 105 cases, Pribram[4] arrived at different conclusions. In this series of cases all women with highly virulent streptococci recovered smoothly; some of those with "avirulent" germs had stormy postoperative complications.

In the group of pelvic infections due to gonorrhea, Patterson[5] states that routine microscopic methods fail to detect most chronic gonococcal infections in women, while cultural methods may give a positive finding missed by the microscopic examinations. The complement-fixation test of blood of suspected cases of chronic gonorrhea gives the highest proportion of positive findings.

It appears that the sedimentation test has received more careful study during the past year. Rubin[6] sees in it a more reliable indication of the condition of the patient than in the temperature chart or leucocytic count. Its diagnostic and prognostic values are secondary to its value in indicating the acuteness of a process. Cherry[16] in a study of the sedimentation test in 71 cases concludes that while it may be an important factor, as a diagnostic agent alone it is untrustworthy in pelvic conditions, and that the leucocytic count is a more reliable indicator of the degree of virulence of the infecting organism, and more dependable as a means to determine the most suitable time to interfere surgically. Schmitz[17] concludes that the sedimentation test is not an aid in the determination of the time of safe operability of adnexal inflammations.

Graves[7] emphasizes the necessity of preserving the full function of the pelvic organs in females under maturity because of their influence on the general development. After the age of maturity, the preservation of reproductive ability is the prime consideration. If this is impossible, every effort should be made to maintain the full menstrual function. Graves removes the ovaries chiefly because they may produce trouble later as the result of cystic degenerations, adhesions, or malignant changes.

Lynch[8] has found that sacral or sacrolumbar backache was a complaint in 49 per cent of 1,041 women who came to gynecologic operations with lesions of the pelvic organs. In 510 cases in which it was a preoperative symptom, 76.5 per cent remained cured for periods ranging from one to eight years. It appeared that backache in gynecologic conditions was due chiefly to pelvic congestion. Schroeder[9] is of the opinion that deep backache is often due to a chronic lymphanigitis or to a contracture of the sacrouterine ligaments and is often due to erosions of the cervix.

Van de Velde[10] believes that much unhappiness could be prevented if sexual infantilism were corrected before marriage so that sexual life would be normal from the first. Organotherapy, diathermy, and vibration massage of the uterus proves successful in many cases.

It is scarcely to be supposed that increased circulation due to diathermy will correct an inherent faultily developed organ. Much caution must be exercised in the interpretation of these results.

Clinical results of diathermy in gynecology are not always as favorable as claimed by the advertisers of such. Cherry[12-13] reports results

in 77 patients with pelvic masses. Of these, 49 were entirely relieved of symptoms, operation being unnecessary or refused by the patient. The question may properly be asked: if these patients were cured, why was operation suggested?

Seymour[14] discusses endoscopy of the uterus as a diagnostic aid in uterine lesions. This is the most appropriate place to refer to the established view that the routine introduction of instruments into the uterus is mischievous.

Meyer and Kaufman[15] discuss the value of biopsy in gynecology. A vast array of accurate data has been accumulated by this comparatively simple operation. Of 146 cases in which a portion of the portio was removed for histologic examination, carcinoma was found in 26. In only 15 of this group had the clinical diagnosis been made. In two cases of this series the microscopic examination revealed cancer when it was not even suspected. Meyer and Kaufman do not beileve that biopsy favors the spread of carcinoma and do not recognize the theory of the so-called precarcinomatous state.

VAGINA AND CERVIX

In a study of the vaginal reaction in the newborn before any bacteria had time to develop Kienlin[19] found lactic acid present, and he attributes its presence to fermentative action of the tissue itself. Lash and Kaplan[20] examined the vaginal flora of 98 pregnant women by means of smears and cultures and found the Döderlein bacillus present in 41 instances. Four strains were isolated but all were serologically similar. Meaker[21] gives a historic review of the vaginal douche, and believes that this common item of pelvic therapeutics is the most worthless if not positively harmful. Except for cleansing purposes before operations, this procedure should become obsolete in the near future. When employed in the presence of infections, it only serves to spread and disseminate the organisms.

Miles[22] gives an interesting classification of hernias of the vagina with methods of treatment. Glassman[23] has published a very ingenious method for the cure of deep culdesac and vaginal hernias or for vaginal enteroceles. This procedure appears to be based on sound anatomic grounds.

The various methods for the treatment of endocervicitis have passed through many phases of progression and degeneration since the early nineties. We do not wish to accuse our eminent predecessors of ignorance with regard to the histologic or pathologic findings in the cervix, yet the teaching and practices advocated are not difficult to comprehend in our times. Painting of the cervix with red dyes (mercurochrome) has supplanted the blue color of methylene blue. The coagulations and different methods of medical diathermies (with special types of apparatus) have supplanted the old destructive method of zinc chloride. And the electrocauterization of the cervix has partly replaced the surgical procedures of amputation. These various new procedures are destined to broaden and ultimately will embrace other pelvic organs before we realize and see the conservative pendulum swinging back to common sense.

Walther and Peacock[24] seriously object to the amputation of the diseased cervix on account of scar tissue which seriously interferes with subsequent labors. The authors state that the gonococci may be effectively killed without injury to the tissues by diathermy and report the

cure of 12 acute and 26 chronic cases. Mikels[25] believes that electrocoagulation is the most conservative method of treating inflammatory lesions in the region of the cervix and is the greatest safeguard against the development of secondary malignancies.

We cannot concur in this belief as the cause of malignancy is still unknown.

C. Jeff Miller[26] gives a very clear and concise discussion of endocervicitis with its many etiologic causes. While a large percentage of cases are undoubtedly due to specific infection, yet there is another group in which the etiology is still far from clear. Matthews[27] gives the results of 226 cauterizations performed without anesthesia. Of these, 180 were cured and 46 improved. The results of 70 total excisions were: 49 cases cured, 16 improved, and 5 not improved. Culbertson[28] gives a very clear and concise description of the causes of endocervicitis. He is of the opinion that erosions are the direct result of excessive discharge, and that changes in the alkalinity or acidity of the discharges are important factors.

Fulkerson[29] analyzed 1,039 cases of endocervicitis. This condition was noted in 33.16 per cent or one-third of all gynecologic patients. Traumatism of labor and abortions appear to be the chief factors, and accounted for 80.1 per cent. Fulkerson accepts the cautery as the standardized method of treatment and reports 65.3 per cent of cures. Davis[30] believes a large percentage of cervical disease is overlooked through neglect of the use of the vaginal speculum in the routine examinations. Results are given in 317 cases treated by the cautery method. This treatment is not recognized as a cure all, but the author believes that it should supplant cervical operations in most cases.

In a very constructive discussion of syphilis of the cervix, Gellhorn[31] again calls our attention to the frequency of this condition. Primary, secondary, and tertiary lesions are described. The tertiary lesions are of much importance as they give rise to symptoms of discharge, bleeding, and resemble carcinoma to such an extent, that many patients have erroneously been subjected to unnecessary and dangerous operations. Cron[32] reports two cases of syphilis of the cervix (chancre) and is of the opinion that the primary lesion occurs frequently on the cervix. Its apparent rarity is due to the fact that it is often overlooked and that it rapidly involutes. McGlinn[33] calls our attention to the presence of granuloma inguinale in the northern latitudes. He reports successful treatment with Dr. Abel's antimony compounds. Schochet discussed the prevalence of granuloma in the United States with a tabulation of the cases reported.

Lockwood[34] describes a rare tumor in a child sixteen months old with method of treatment. The microscopic sections revealed a rhabdomyoma sarcoma botryoides. Another rare tumor of the uterus, a hemangioma is reported by Wright.[35]

MALPOSITIONS

Bullard[36] reports on a study of the end-results of 361 operations for prolapse of the uterus in the Woman's Hospital. The Watkins operation was performed on 77 patients with 63.6 per cent complete success, or 96 per cent, if we include those cases with minor defects or symptoms. Although anatomically satisfactory, sixteen patients had bladder symptoms which persisted from three months to several years. Complete

failures occurred in 3.8 per cent. The Mayo operation was performed in 50 cases. Complete success was noted in 76 per cent, success with minor defects 94 per cent. Complete failure was encountered in three cases. Enterocele was present in 20 per cent. Of these, 16 per cent had small enteroceles without symptoms and did not require operation. Vaginal hysterectomy was performed in 74 cases: complete success in 78.3 per cent; failures in 4 per cent; total successes with minor defects 95.8 per cent.

Vaginal plastics were performed on patients with first and second degree prolapse in 81 cases. Of these 2.5 per cent were complete failures. Total successes with minor defects were obtained in 97.5 per cent of the cases. There were also 56 cases with first degree prolapses.

The most striking thing about this study of the results of the operations for uterine prolapse is that 95 per cent of the cases are cured by vaginal plastic surgery.

One of the important pathologic factors often overlooked in prolapse is the displacement or prolapse of the bladder from the anterior uterine wall.

Brady[37] reports the end-results of the Watkins interposition operation for prolapse in 56 patients operated upon by Dr. Cullen. Of the 48 patients responding to questionnaires, 45 were relieved of all symptoms. Brady notes that there were no deaths and believes that the interposition operation produces the least shock.

Clark and Ferguson[38] believe that cystography is the most convincing and exact method of showing the deformity of the bladder that occurs in cystocele and decensus, and the degree of anatomic reposition of the bladder obtained with various operations. The authors report the finding of eight cases with preoperative and postoperative cystograms showing the position and shape of the bladder.

Danforth and Galloway[39] investigated the frequency of retrodisplacement in a series of 1,000 private patients. Of these 18.8 per cent had retrodisplacement during pregnancy and puerperium. Danforth emphasizes that the importance of retrodisplacement as a pathologic entity as the cause of abortion and sterility is much less than commonly believed. Of this series, 9 per cent were cured with postural treatment and exercise.

A careful study of this subject indicates the faulty conclusions prevalent concerning the retroverted uterus. Meyer-Wirz[40] believes, contrary to other gynecologists, that a movable retroflexion may be the cause of various symptoms, and should be corrected by pessary or Alexander-Adams operation.

We must not forget that over 20 per cent of women normally carry their uteri in a retroverted position, and that advantage should not be taken of this fact for pelvic engineering. The late Doctor Watkins said: "The round ligament operation seems to have ceased to be a subject of much general interest."[41]

ENDOMETRIOSIS

Sampson[42] is of the opinion that pelvic peritoneal endometriosis is usually due to the escape of menstrual blood into the peritoneal cavity with a subsequent local reaction, and with implantation of fragments of uterine mucosa at these points. Novak[43] reports a histologic study of many hundreds of fallopian tubes with particular reference to their contents. In seven tubes particles of uterine mucosa were demonstrated

lying free in the lumen. None of the women from whom these endometria containing tubes were removed were menstruating at the time. In none of these cases did the endometrium in the tubes show the characteristic picture of endometrium thrown off at menstruation. In at least five of the cases the particles of free endometrium were so large that it seemed almost impossible for them to have entered the tiny uterine orifice of the tube. The suggestion that they were probably moving toward rather than away from the uterus is strengthened by the finding of definite endometrial tissue in the ovary in at least two of the five cases.

Thirteen observations made in the course of operations upon women who were menstruating and whose tubes were opened failed to show regurgitation of menstrual blood in a single case. No blood has apparently been observed in the pelvis in the thousands of women operated upon by thousands of surgeons immediately after menstruation, and if any menstrual blood had escaped into the pelvis it could scarcely have been resorbed in such a brief space of time. It seems logical to conclude therefore that while regurgitation through the tube is possible, it is exceedingly infrequent, too infrequent to explain such a very common lesion as pelvic endometriosis. Moreover, it appears incredible that degenerative tissue could thread itself into the tubal orifice, make its way upward, and after probably many days, still have sufficient vitality to grow where it falls. This is especially impossible because of the very rapid autolytic and degenerative changes that occur in the tissue cast off during menstruation. Novak is of the opinion that if implantation of the endometrium occurs, as it well may, it is the ovary from which the seed is primarily dropped rather than from the tube.[44]

Davis and Cron[45] report nine cases of endometriosis, one in which the endometrial implants were probably due to transuterine inflation. Heaney reported six cases of endometriosis, three of which followed a laparotomy. Danforth states that he has observed the escape of menstrual blood from the fallopian tube during menstruation. Curtis has also observed this condition in three cases.

White[46] reports a case of decidual reaction in an adenomyoma of the rectovaginal septum.

Many cases of endometrioma are being reported in the literature, but there is one fact about which there can be no doubt, namely, that we do not know the true etiology of endometriosis.

MENSTRUAL DISORDERS

Novak[47] calls attention to a definite group of cases of menorrhagia in which the endometrial scrapings present an increase of stroma and glandular elements with a very characteristic Swiss-cheese pattern. This group offers a difficult problem especially in young patients in whom the child-bearing period must be seriously considered. Repeated curettage brings only temporary relief until the endocrine balance is restored. In those who are near the menopause or have had offspring, radium therapy or hysterectomy is indicated. Whitehouse[48] analyzed 200 consecutive cases of functional uterine hemorrhage with no obvious physical signs, and concludes that the normal regular menstruation is the monthly abortion of the decidua of an unfertilized ovum. The author classifies this excessive menstrual flow into four groups and believes that one type is due to a functional hyperthyroidism or hypersensibility of the sympathetic nervous system.

We do not know why women menstruate, as this is the only known physiologic process in the body that is associated with hemorrhage. It seems that too many unknown conditions are attributed to the sympathetic nervous system. In another contribution on menstruation, Whitehouse[49] considers the premenstrual dilatation of the uterine glands as artefacts due to constriction of the ducts by the stroma. This appears at variance with our newer conception of the development of the uterine glands by the process of budding from the basal layer.

Biedl[50] discusses the characterization of puberty from the viewpoint of the prevalence of different endocrine glands at various ages. It is difficult to understand clearly this contribution unless we wish to enter speculative medicine with the supposed actions of the endocrine organs or groups of interrelated endocrine organs on the organism. Fekete[51] studied 19 cases of uterine hemorrhage in young girls and concludes that a large percentage of the patients presented objective evidence of lowered ovarian function; that the direct cause of long-continued bleedings are disharmony between the mucous membrane, undeveloped musculature, the instability of the vasomotor system, and possibly an abnormal composition of the blood. Here again we wish for more concrete facts and data.

Forsdike[52] reports excellent results in the treatment of 200 cases of idiopathic or essential uterine hemorrhage with radium therapy. Schmitz[53] gives the clinical characteristics of menstruation and uterine hemorrhage in 1,200 women. With the exception of the menorrhagias due to malignancies and incomplete abortion, Schmitz is of the opinion that the most important form of metrorrhagia is due to hemorrhagic metropathy or endometrial hyperplasia due to a persistent ovarian follicle. Miller[54] in a very interesting paper on the curettage of the uterus states that in a small group of well-selected cases curettage will cure intractible menorrhagia. Other cases with dysmenorrhea have also been relieved either by the preliminary dilatation or by the curette.

MALIGNANCY

It is no false humility to state that despite the amount of research that has been devoted to the study of cancer during late years, we are only at the beginning of a knowledge of its pathology. We have gained some information regarding the classification of tumors, the methods or mechanism of tumors, and the mechanisms of metastasis. Statistical studies have been materially widened. But in regard to the etiology, the most important factor of this great problem, the data we possess are painfully deficient.

Schmitz, Hueper, and Arnold[55] have made a careful comparative study of 61 cases of cervical carcinoma to ascertain whether the pathologist and clinician could deduce conclusions concerning the prognosis from their findings. These authors have tabulated their results based on a number of factors to which they have given values to determine a malignancy index. They have concluded that there is a definite relation of the cell type to this index. Plant[56] in a critical study of many hundred sections of carcinoma concludes that there is no reliable basis for a "histologic" prognosis in cervical carcinoma. The clinical classification of carcinoma of the cervix is still the best aid in making a prognosis. Pemberton,[57] in a study on the relation between the treatment of cancer of the cervix and of the cell type, concludes that the type of cell does not indicate

whether operation or radium is the better treatment; that cases having more stroma than cancer tissue respond more favorably to either method of treatment than those with more cancer tissue than stroma. Culbertson in discussing this report states that we are not justified in giving a prognosis based on the cell type of uterine cancer. Ward and Keene are unable to attach any value to the predominating cell as a prognostic index.

Cordua[61] in a study of 40 cases of cancer of the cervix concludes that the prognosis is more favorable in the more differentiated form of carcinoma than in the less differentiated ones.

There are several instructive points about this relationship of prognosis to histologic findings, yet there is one important fact about which there can be no doubt, that is, that sections taken from different areas of the same tumor mass will give different histologic findings in reference to mitotic figures, degenerative areas, invasions, and blood supply. Bearing these facts in mind, it is clear that much may be said concerning morphologic grouping, yet regarding their true significance to prognosis, we must be comparatively brief.

A study on the question of relationship between the blood picture and prognosis of irradiated carcinoma of the uterus is reported by Hall.[60] The blood picture was examined before and again from eight to eleven days after irradiations. The cases with a favorable clinical course were followed with a relative and a small absolute increase in the lymphocytes. Unlike other investigators Hall was unable to find that an eosinophilia indicated a tendency towards cure, nor can one predict a recurrence from the blood picture.

During the past year many gynecologists have made a more extensive use of radium in the treatment of carcinoma of the cervix in preference to the radical surgical extirpation, and some of our leading authorities have abandoned surgery in the treatment of cervical cancer. The proper methods of treatment of this condition (surgery or radiotherapy) deserves more attention than can be given to it in a review of this type.

Hochman[62] reviews a series of 1,114 cases in which a supravaginal hysterectomy was performed in the Woman's Hospital of New York. Only three of the patients developed carcinoma in the stump, or 0.27 per cent. This excellent paper emphasizes that there is no necessity of routine panhysterectomy with its increased mortality. Isbruch[63] reports two cases of stump carcinoma after supravaginal hysterectomy and compares these with the 65 reported cases in the literature. He concludes that in spite of the possible factor of malignancy, the advantages of supravaginal operations should not be given up.

Koerner[64] reports a case of sarcoma in a stump of a supravaginal hysterectomy.

Kaufman[65] presents a statistical study of 2,000 cases of carcinoma of the pelvis with reference to age and living conditions. Before the war cancer incidence was highest between the ages of 50 and 55 years, while during the war it was highest between 46 and 50 years; and since the war it has been highest between the ages of 41 and 45 years.

Clark[66] and Norris obtained 56.5 per cent of three year cures of carcinoma of the fundus in which the symptoms had been noted for less than six months, and only 17.8 per cent in which the symptoms had been noted for over one year.

Farrar[67] urges the repair of the cervix due to trauma or infection as an important feature in the eradication of cancer. Five stages are recognized in carcinoma cases treated with radium: namely, the stage of hyperemia, slough, healing, contraction, and marked contraction. Hohmes and Dresser[68] present an interesting account of the action of radium on different types of tissue. Fat is very resistant, nerve tissue is little affected even by heavy radiation, and intestinal mucosa is particularly susceptible.

There appears to be wide differences of opinion in regard to the periods of relief in inoperable carcinoma cases. Dalsgaard and Nielsen[69] report 12 per cent relief from all symptoms for periods up to three years and only 37 per cent showed no benefit. Hoed[70] reports cures in 6.5 per cent of inoperable cancer cases, and 66 per cent of the operable cases for three year periods . Such results are at variance in many radium clinics. Ransohoff[71] in a study of sixty cases of carcinoma concludes that radium offers results as favorable as those following operation. Phillips[72] reports similar results from the Berlin University Gynecologic Clinic. Döderlein and Voltz[73] sum up the experience in 2,300 cases of carcinoma and conclude that radiologic is superior to operative treatment as it is successful in curing even inoperable cases. Much caution should be exercised in evaluating these dogmatic conclusions.

Regaud,[74] Beuthrer, Recases, and Horsdihe state that, according to most reliable statistics, radium treatment effects a cure in from 15 to 20 per cent of cancer of the cervix regardless of the stage of development of the cancer. In inoperable carcinoma the incidence of cure is from 5 to 15 per cent, while in operable cases as a whole it is from 30 to 40 per cent, and in the most favorable group of cases it is from 40 to 60 per cent. Heimann,[75] in his studies on preoperative x-ray irradiation of carcinoma of the uterus, concludes that the deeper carcinoma cells are not affected by the treatment and that these viable cells can still proliferate and reduce the chances of success. Ward and Farrar[76] in a critical review and analysis of carcinoma of the cervix and body conclude that radium alone is preferable to surgery in all classes of carcinoma of the cervix.

Findley[77] in an excellent paper on precancerous lesions advocates vigorous education of the laity. He considers a lesion as precancerous when the epithelial cells are enlarged, irregular in size, with hyperchromatic nuclei and indistinct border outlines.

Bonney[78] performed the Wertheim-Ries operation for carcinoma in 214 of 340 unselected cases. He followed closely the technic of Ries in removing the cellular tissue occupying the obturator fossa as well as the glands lying along the veins, and practically all of the vaginal canal.

Thirty-four of the 214 patients died from operation, 82 died from recurrence, five died from other diseases, eight were lost sight of, and 85 were free from recurrence after five years.

The reader will probably note that the results of radiotherapy in this review have been given more space than the time honored surgical procedure. For we are of the opinion that operation is more sound and is the method of choice to be employed in properly selected cases. In spite of the inspired statistics of radium therapy and the ambitions of the roentgenologists, the death-rate remains without appreciable change.

STERILITY

Much caution should be exercised in the diagnosis of sterility, as more than one factor may be the cause of this condition. In a fairly large group of women there appears no obstruction of the fallopian tubes and yet they remain sterile.

Fogelson[79] in a well-planned series of experiments has attacked this problem on immunologic grounds. There was produced a temporary inhibition of fertility in his series of animals. Macomber[80] points out that the degree of fertility is indicative of the completeness and normality with which the reproductive organs are functioning, and that it is intimately bound up with conditions of general health. Sure[81] in an experimental study was able to produce sterility by deficiencies in diet.

Rubin[82] found that injections of collargol, thorium, bromide and iodide solutions produced peritoneal reactions in the patient. Inspissation persisted for some time in the tubal lumen when the tube was open, though in nonpatency no harm resulted. Stein and Arens[83] have combined pneumoperitoneum and the injection of opaque media for uterine and tubal diagnosis. No definite conclusions on this procedure are given by the authors on account of the comparatively few cases.

This is a very healthy and conservative attitude, as enthusiasm for the new is not infrequently permitted to obscure the merits of time honored and tried methods of diagnosis.

Beclére[84] emphasized the necessity of controlling the pressure when iodized oil is injected into the uterus. Pressures not exceeding 30 cm. of mercury produce no pain or complication. With a pressure of 40 cm. of mercury lipiodol may enter the blood vessels. Newell[85] gives a detailed description of the technic to be employed. Rongy[86] deplores the too frequent use of this procedure in the hands of the roentgenologist. There is no doubt that many patients suffer from sequelae as a result of insufflation made by mere technicians. Berri[87] noted that repeated tests with the Rubin method are necessary before we can claim a nonpatency of the tubes. It is not infrequent that a second or third test will reveal a tube patent which gave negative findings with the first test. Miles[88] suggests that Rubin tests be applied during abdominal operation and thus the patency of each tube can be accurately determined along its entire course. No description of the various technics and simplified methods of inflation[89-90] of the fallopian tubes will be given in this review.

Isbruch[91] sums up the results of operations of interpolar resection of the ovary and plastic operations of the tubes. Pregnancy ensued in 49.3 per cent of the 72 patients with primary sterility.

ECTOPIC PREGNANCY

The differential diagnosis of ectopic pregnancy from other acute abdominal affections presents one of the most difficult and important chapters in gynecology. Very few other acute conditions of the abdomen require the immediate attention of the gynecologic surgeon. It is for these reasons that every sound additional aid in the diagnosis of this condition is welcomed.

Danforth[92] calls attention to a referred pain in the shoulders in ruptured tubal pregnancy, particularly in those cases in which there is considerable intraabdominal hemorrhage. This is caused by the accumulation of escaped blood in the subphrenic space resulting in traction on the

falciform ligament. A similar condition is frequently noted in patients after transtubal insufflation. Zeitlin[93] speaks of the value of exploratory puncture in the posterior vaginal wall, if not attempted in a state of shock. While it gives valuable information for the method of treatment to be employed, especially if pus or microorganisms are present, it should not be the sole basis for diagnosis. Kritzler-Kosch[94] emphasizes the value of a positive Hegar sign in intrauterine pregnancy as an aid in the differential diagnosis between extra- and intrauterine pregnancy. Repeated taking of leucocytic count, blood pressure, and hemoglobin percentage often reenforces a doubtful diagnosis of ectopic pregnancy.[95]

To add to the confusion of diagnosis a simultaneous intrauterine and ectopic pregnancy may be encountered. Novak[96] reports two cases of combined ectopic and intrauterine pregnancy with a summary of the 276 reported cases. An additional case of such combined pregnancy is reported by Sourasky.[97] A very interesting case of ovarian pregnancy associated with intrauterine pregnancy is described by Vineberg.[98] Cases of double ectopic pregnancies are recorded by Stuckey[99] and Clow.[100] Stallworth[101-102] reports a case of full-term intraligamentous pregnancy. Steckbauer[103] publishes an unusual ectopic pregnancy in an anomalous fallopian tube.

The fallopian tube with its normal tortuous course and especially after a previous infection, seemingly accounts for a large number of cases reported as diverticula of the tube. A careful systematic study of several hundred fallopian tubes should be undertaken to determine the frequency of diverticula. In most cases it appears that the diverticula seen in sections are due solely to the plane in which the specimen is sectioned.

However, McNalley[106] is of the opinion that diverticula play an important rôle in the etiology of ectopic pregnancy. Of the twelve cases studied by him he reports diverticula present in 10, or 83.3 per cent. Schoenholz[107] examined 32 pregnant tubes in which congenital diverticula were present in 15 cases.

Von Mikuliez-Radecki[108] from experimental investigations on tubal movements concludes that the ovum is transported by a rhythmic peristalsis, independent of any stimulus from the ovum. The author noted a definite change of rhythm in normal and pathologic tubes both in the longitudinal and circular muscular fibers.

Unterberger[109] reports a normal delivery after tubal implantation in one of his four cases. It is suggested that in patients in whom no portion of the tube is suitable for implantation, ovarian tissue should be implanted within the uterine cavity. Cotte and Bertrand[110] report three cases of implantation of the tube. Lipiodol injections showed the tube to be permeable but pregnancy has not occurred in any of the cases.

OVARY

It is difficult to evaluate properly the various researches on ovarian function. The fact remains that the complete chapter on the physiology of the female reproductive organs has not as yet been written.

It is impossible to make reference to the many papers on endocrine glands and evidences of interrelation with the ovary. The vastness of the work has been well expressed by Dr. Abel:[111] "Never before were there so many investigators, chemists, biologists, pathologists and clinicians engaged in one phase or another of this enormous subject. Already the usual output of special articles in this field numbers 3,000 per annum."

In the present state of our knowledge of hormones it is impossible to make definite statements as to the true meaning of ovarian (follicular) hormone. The peculiarity of these substances is that they are produced in one organ, and carried by the blood current to another organ, on which their effect is manifested. The fact that this ovarian hormone has been isolated from the placenta as well as from the umbilical cord raises considerable difficulty in the interpretation of a specific hormone.

Another very important fact to be borne in mind is the view advanced by Kantz, that it is impossible to obtain any such substance in the form in which it existed in the living cell. If this view be correct (and there is every reason to believe it to be true since living cells are in a continual progress, never actually arriving at an equilibrium), it would follow that the extracts of various cell constituents by chemical methods are not identical with those that exist in the living cell. Pratt, Allen, and Edgar[112] have made extensive experiments with the ovarian follicular hormone. A fact of considerable difficulty of interpretation was the failure to produce bleeding in a series of spayed monkeys or ovarectomized human females during the periods of injection of this hormone. This is at variance with the action of other known hormones as shown by the injection of secretin on the pancreas. Parker and Ballerby[113] report active, oestrous-producing substances from extracts of ovaries. Out of eight cases, the residual tissue had a greater activity than the corresponding liquor folliculi. Frank and Goldberger[114] report the presence of a female sex hormone in the circulating and menstrual blood of the human female. In a later paper[115] they state that it appears in the circulation from ten to fifteen days before the onset of menstruation in an amount increasing as the time of menstruation is approached, and that it then appears in the menstrual blood in considerable concentration, disappearing at the same time from the general circulation. This can be applied as a clinical test to determine the approximate time of ovulation, early pregnancy, and whether menorrhagia or metrorrhagia are due to an excess or deficiency of the ovarian hormone. Ralls, Jordon, and Doisy[116] have devised an improved method for the preparation of the hormone from hog liquor folliculi. This method yields a product virtually free from cholesterol whose potency is 25 to 40 rat units per milligram of solids. Laquer Hart and de Jough[117] observed an increased metabolism in castrated females after injections of ovarian hormone. Kylin[118] showed that extracts of liquor folliculi caused in every case a rise in blood sugar, extracts of corpus luteum a decrease in blood sugar. Zondek[119] determined that the content of woman's ripe follicle is 3 to 5 rat units, and he believes that the unit should correspond to the amount in the follicle instead of body weight. If the principle of weight were applied to hormones, the dose of pituitary extract in woman would be six hundred times larger than now employed. Doisy et al[120] conclude that the female sex hormone is taken up by the lymph and blood stream and selectively utilized only by Mueller's tract and the breasts. Hartman, Dupre and Allen[121] have shown that the sex hormone is not specific for species. They are of the opinion that this ovarian hormone consists of a definite compound, or at least a common organic radical, widely distributed in the animal series.

With regard to the ovarian hormone again it has to be noted that we possess only scattered data rather than a full knowledge, and we are not entitled to assume too many physiologic actions.

In a very picturesque description Hirsch[123] outlines many but little understood functions of the ovary modified by x-ray treatment. In one section of his paper there is a suggestion that radiation may result in the production of a hormone due to its effects on the interstitial cells or pelvic structures.

Elaborate assumptions are sometimes made to explain a theory but we are not entitled to accept them as definite statements in scientific medicine.

Shaw[124] in a study of the interstitial cells of the human ovary states that these cells are found with extreme difficulty with the usual hematoxyln stains. In his opinion the interstitial cells are formed from the theca interna of the corpus luteum and are present as early as the thirty-second week after intrauterine life.

Manheim[125] describes a rare tumor of the ovary, namely, a folliculoma ovarii malignum.

Delannoy and Breton[126] report a primary cylindrical epithelioma of the ovary derived from the Wolffian rests.

REFERENCES

(1) Jour. Am. Med. Assn., 1926, lxxxvi, 1437. (2) Ann. Surg., 1926, lxxxiii, 449. (3) Zentralbl. f. Gynäk., 1926, l, 129. (4) Zentralbl. f. Gynäk., 1926, l, 137. (5) Jour. Immunol., 1926, xii, 293. (6) Surg., Gynec. and Obst., 1926, xlii, 652. (7) Am. Jour. Obst. and Gynec., 1926, xii, 217. (8) Am. Jour. Obst. and Gynec., 1926, xii, 719. (9) Zentralbl. f. Gynäk., 1926, l, 947. (10) Nederl. Tijdschr. v. Geneesk., 1926, i, 626. (12) Jour. Am. Med. Assn., 1926, lxxxvi, 1745. (13) Surg., Gynec. and Obst., 1926, xlii, 600. (14) Proc. Roy. Soc. Med., 1926, xix, 74. (Sect. Obstr. and Gynaec.) (15) Zentralbl. f. Gynäk., 1926, l, 20. (16) Am. Jour. Obst. and Gynec., 1926, xi, 105. (17) Am. Jour. Obst. and Gynec., 1926, xi, 353. (19) Zentralbl. f. Gynäk., 1926, l, 644. (20) Jour. Infect. Dis., 1926, xxxviii, 333. (21) Jour. Am. Med. Assn., 1926, lxxxvii, 1377. (22) Surg., Gynec. and Obst., 1926, xlii, 482. (23) Surg., Gynec. and Obst., 1926, xlii, 837. (24) Southern Med. Jour., 1926, xix, 202. (25) Surg., Gynec. and Obst., 1926, xliii, 105. (26) Jour. Am. Med. Assn., 1926, lxxxvii, 1695. (27) Jour. Am. Med. Assn., 1926, lxxxvii, 1802. (28) Jour. Am. Med. Assn., 1926, lxxxvii, 1808. (29) Am. Jour. Obst. and Gynec., 1926, xii, 374. (30) Jour. Am. Med. Assn., 1926, lxxxvi, 1763 (31) Jour. Am. Med. Assn., 1926, lxxxvii, 1926. (32) Am. Jour. Obst. and Gynec., 1926, xi, 378. (33) Am. Jour. Obst. and Gynec., 1926, xii, 665. (34) Jour. Am. Med. Assn., 1926, lxxxvii, 1859. (35) Surg., Gynec. and Obst., 1926, xliii, 282. (36) Am. Jour. Obst. and Gynec., 1926, xi, 623. (37) Surg., Gynec. and Obst., 1926, xliii, 476. (38) Surg. Clin. N. Amer., 1926, vi, 79. (39) Jour. Am. Med. Assn., 1926, lxxxvii, 826. (40) Schweiz. med. Wchnschr., 1926, lvi, 121. (41) Am. Jour. Obst., 1926, xii, 89. (42) Am. Jour. Obst. and Gynec., 1926, xii, 459. (43) Am. Jour. Obst. and Gynec., 1926, xii, 484. (44) Internat. Abstr. Surg., Gynec. and Obst., April, 1927, pp. 299. (45) Am. Jour. Obst. and Gynec., 1926, xii, 526. (46) Am. Jour. Obst. and Gynec., 1926, xi, 112. (47) Jour. Am. Med. Assn., 1926, lxxxvi, 1105. (48) Brit. Med. Jour., 1926, ii, 723. (49) Jour. Obst. and Gynec. Brit. Emp., 1926, xxxiii, 380. (50) Monatschr. f. Kinderh., 1926, xxxi, 347. (51) Arch. f. Gynaek., 1926, cxxviii, 540. (52) Brit. Med. Jour., 1926, i, 472. (53) Northwest Med., 1926, xxv, 543. (54) Am. Jour. Obst. and Gynec., 1926, xii, 860. (55) Am. Jour. Roentgenol., 1926, xvi, 30. (56) Surg., Gynec. and Obst., 1926, xliii, 450. (57) Am. Jour. Obst. and Gynec., 1926, xii, 536. (55) Am. Jour. Roentgenol., 1926, xvi, 30. (56) Surg., Gynec. and Obst., 1926, xliii, 450. (57) Am. Jour. Obst. and Gynec., 1926, xii, 536. (60) Arch. f. Gynäk., 1926, cxxvii, 708. (61) Brit. Jour. Radiology, 1926, xxxi, 477. (62) Am. Jour. Obst. and Gynec., 1926, xi, 566. (63) Zentralbl. f. Gynaek., 1926, l, 1771. (64) Monatschr. f. Geburtsh. u. Gynaek., 1926, lxxiv, 76. (65) Zentralbl. f. Gynaek., 1926, l, 198. (66) Surg. Clin. N. Amer., 1926, vi, 118. (67) Surg., Gynec. and Obst., 1926, xliii, 719. (68) Northwest Med., 1926, xxv, 467. (69) Hospitalstid., 1926, lxix, 64. (70) Nederl. Tijdschr. v. Geneesk., 1926, ii, 1039. (71) Ohio State Med. Jour., 1926, xxii, 763. (72) München. med. Wchnschr., 1926, lxxiii, 272. (73) Acta Radiol., 1926, vi, 335. (74) Gynécologie, 1926, xxv, 218. (75) Zentralbl. f. Gynaek, 1926, l, 1945.

(76) Am. Jour. Obst. and Gynec., 1926, xi, 439. (77) Am. Jour. Obst. and Gynec., 1926, xi, 450. (78) Proc. Roy. Soc. Med., 1926, xx, 120. (79) Surg., Gynec. and Obst., 1926, xliii, 374. (80) New York State Med. Jour., 1926, xxvi, 179. (81) Jour. Biol. Chem., 1926, lxix, 29. (82) Am. Jour. Surg., 1926, i, 1. (83) Jour. Am. Med. Assn., 1926, lxxxvii, 1299. (84) Gynéc. et Obstét., 1926, xiv, 105. (85) Am. Jour. Obst. and Gynec., 1926, xii, 189. Am. Jour. Obst. and Gynec., 1926, xi, 616. (87) Semana méd., 1926, i, 657. (88) Surg., Gynec. and Obst., 1926, xliii, 97. (89) Deutsch. med. Wchnschr., 1926, lii, 1155. (90) Jour. Am. Med. Assn., 1926, lxxxvii, 409. (91) Zentralbl. f. Gynäk., 1926, l, 1705. (92) Am. Jour. Obst. and Gynec., 1926, xii, 883. (93) Monatschr. f. Geburtsh. und Gynäk., 1926, lxxii, 168. (94) Zentralbl. f. Gynäk., 1926, l, 2177. (95) Zentralbl. f. Gynäk., 1926, l, 1150. (96) Surg., Gynec. and Obst., 1926, xliii, 128. (97) Lancet, London, 1926, ii, 650. (98) Am. Jour. Obst. and Gynec., 1926, xii, 332. (99) Med. Jour. Australia, 1926, ii, 147. (100) Jour. Am. Med. Assn., 1926, lxxxvi, 1979. (101) Am. Jour. Obst. and Gynec., 1926, xi, 512. (102) Am. Jour. Obst. and Gynec., 1926, xi, 863. (103) Jour. Am. Med. Assn., 1926, lxxxvi, 621. (104) Am. Jour. Obst. and Gynec., 1926, xii, 253. (105) Am. Jour. Obst. and Gynec., 1926, xi, 305. (106) Am. Jour. Obst. and Gynec., 1926, xii, 303. (107) Arch. für Gynäk., 1926, cxxvii, 609. (108) Arch. für Gynäk., 1926, cxxviii, 318. (109) Monatschr. f. Geburtsh. u. Gynaek., 1926, lxxiii, 1. (110) Lyon chir., 1926, xxiii, 660. (111) Bull. Johns Hopkins Hosp., 1926, xxxviii, 1. (112) Jour. Am. Med. Assn., 1926, lxxxvi, 1964. (113) Jour. Physiol., 1926, lxi, 562. (114) Jour. Am. Med. Assn., 1926, lxxxvi, 1686. (115) Jour. Am. Med. Assn., 1926, lxxxvii, 1719. (116) Jour. Biological Chemist, 1926, lxix, 277. (117) Deutsch. med. Wchnschr., 1926, lii, 1333. (118) Ztschr. f. d. ges. exper. Med., 1926, li, 599. (119) Klin. Wchnschr., 1926, v, 1218. (120) Endocrinology, 1926, x, 273. (121) Endocrinology, 1926, x, 291. (123) Surg., Gynec. and Obst., 1926, xliii, 659. (124) Jour. Obst. and Gynec. Brit. Emp., 1926, xxxiii, 183. (125) Arch. Path. and Lab. Med., 1926, i, 557. (126) Bull. Soc. d'obst. et de gynéc. de Paris, 1926, xv, 239.

Dr. J. Wesley Bovee, a member of the Advisory Editorial Board of this Journal since its founding, died in Washington, D. C., on September 3, 1927, after a lingering illness. A more complete obituary will appear in the October issue.